TECHNOLOGY DEPT

A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

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McGRAW-HILL PUBLISHING COMPANY, INC.

PRICE 20 CENTS

JULY 1941

This Month

Navy's High-Speed Program of Low Cost Housing

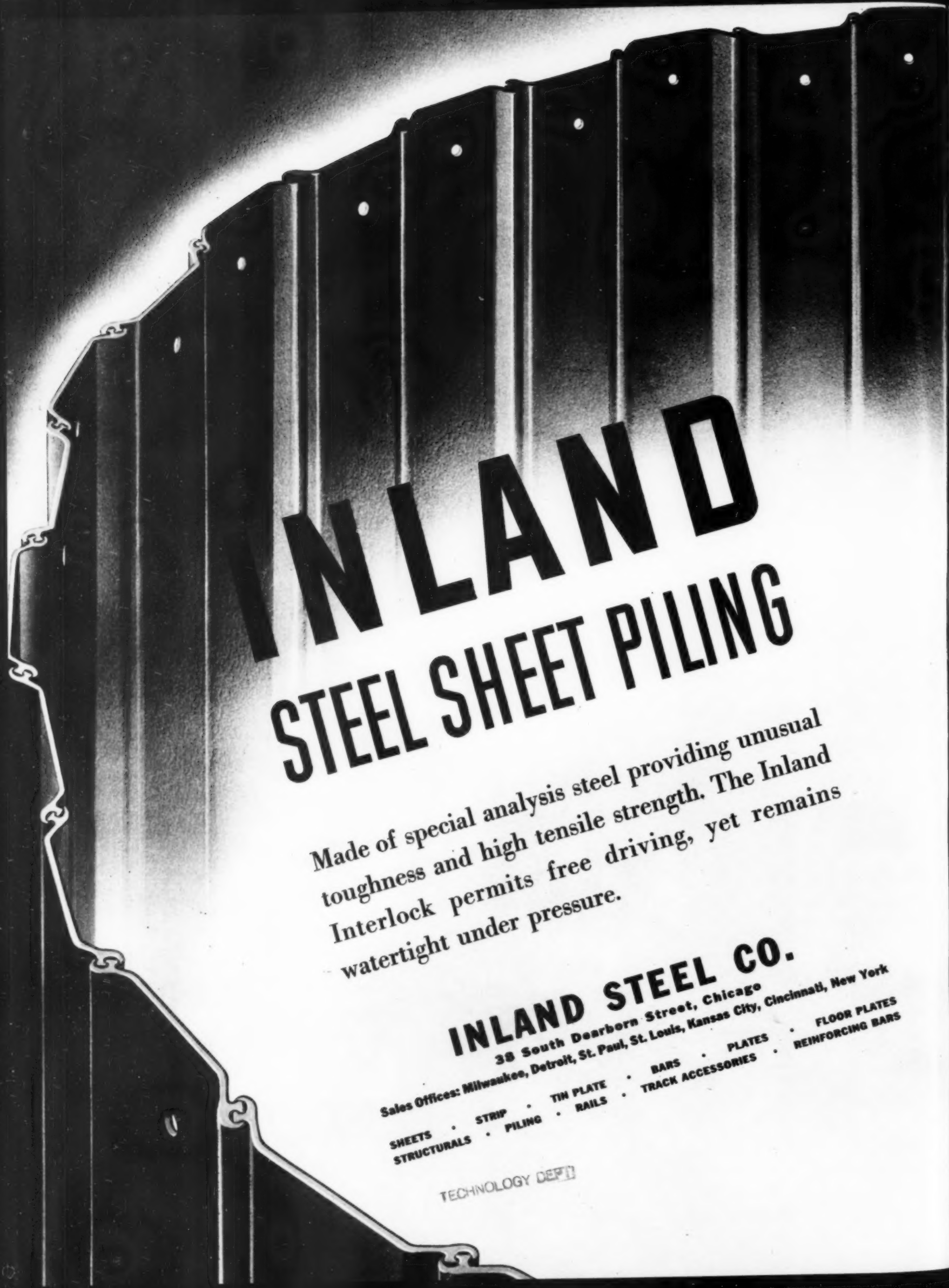
Concrete Bridge Piers of Skyscraper Height

Army Tent Camp Built to House 20,000 Men

Brick Pavement Reinforced With Steel Rods

Long Steel Arch Built Without Framework

...T RIVER BRIDGE in California
...55,000,000 double-deck ... span
..., with concrete piers 360 ft.
...gh, carrying railway and ...
...ay relocations around reservoir
...ite at Shasta Dam.



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TECHNOLOGY DEPT

CURRENT JOBS

. . . . and Who's Doing Them

BUILDINGS

Public—In Texarkana, Tex., War Department awarded contract for loading plant for artillery shells and bombs, to **John Griffiths & Son Construction Co.**, of Chicago, Ill., at estimated cost of $45,000,000. In Chicago, Ill., **James Stewart Corp.**, local contractor, received War Department contract to build foundry and brass plate rolling mill at cost of $10,000,000, including equipment; to be financed by Defense Plant Corp. **Cauldwell-Wingate Co.**, of New York, N. Y., will construct Herman Gardens Housing project, in Detroit, Mich., for $8,212,000. In Windsor, Ont., Canada, **Dinsmore-McIntire, Ltd.**, of Windsor, will erect machine-gun plant, to be operated by General Motors Corp. of Canada, Ltd., for $8,000,000. Navy Department awarded contract for storage warehouse facilities at Naval Supply Depot, Bayonne, N. J., to **Wigton-Abbott Corp.** and **Mahony-Troast Construction Co.**, of Plainfield, N. J., at cost of $5,723,000 on cost-plus-fixed-fee basis. **Robert E. McKee**, of El Paso, Tex., will build housing facilities, boiler house and aviation mechanics school, in Wichita Falls, Tex., for $4,886,879.

At Camp San Luis Obispo, Calif., **L. E. Dixon Co.** will erect 134 day room buildings, two barracks buildings, water supply system and concrete dam 130 ft. high, at cost of $2,500,000. In Linden, N. J., defense housing project, consisting of 700 frame homes, is under way by **C. F. MacEvoy Co.**, of Newark, at estimated cost of $2,500,000. In Roxbury, Mass., 774-unit Orchard Park housing project will be built by **M. S. Kelliher Co.**, of Boston, Mass., for $2,896,000. **M. Shapiro & Son Construction Co., Inc.**, of New York, N. Y., will build 450-unit housing project in Middletown, Pa., at price of $1,447,000. Contract to build barracks, recreational buildings and housing at Camp Blanding, Fla., went to **Watt & Sinclair**, of West Palm Beach, for $1,062,663. **John Bowen Co., Inc.**, of Boston, Mass., will erect 13-story brick apartment house in East Boston, Mass., for total of $1,564,000.

HEAVY CONSTRUCTION

George A. Fuller Co. and **Merritt-Chapman & Scott Corp.**, of New York, N. Y., received $22,800,000 additional contract for air bases at St. Lucia, British Guiana; Jamaica and Antigua, British West Indies, and construction assembly and shipping depot Naval Air Station, Quonset Point, R. I. Pipeline from Baton Rouge, La., to Greensboro, N. C., is under construction by **Ford Bacon & Davis, Inc.**, of New York, at estimated total of $15,000,000. Low bidder for construction of Brooklyn tunnels of Brooklyn-Battery Tunnel, New York, was **George H. Flinn Corp.**, of New York, with bid of $13,888,000. Construction of natural gas system from Monroe Field, La., to Birmingham, Ala., and Atlanta, Ga., is under way by **Ford Bacon & Davis, Inc.**, of New York City, for approximately $8,000,000. In Los Angeles, Calif., **California Shipbuilding Corp.** will build six shipways for $4,330,000, to be financed by U. S. Maritime Commission. **Mitry Bros. Construction Co.**, of Los Angeles, Calif., will construct rolled-fill earthern dam in Piedmont, Mo., at cost of $2,790,081. **Aberthaw Co.**, of Boston, Mass., will build drydock at Navy Yard, Portsmouth, N. H., for $2,500,000 on cost-plus-fixed-fee basis.

Four shipways are under construction in South Portland, Me., by **South Portland Shipbuilding Corp.**, at estimated cost of $3,000,000. Successful bidders for dam and reservoir contract in Indianapolis, Ind., were **Smith & Johnson**, local contractors, for $1,500,000 on cost-plus-fixed-fee basis. Air base in Tuskegee, Ala., is under way by **McKissack & McKissack Co.**, of Nashville, Tenn., at cost of $1,480,295. **Gunther & Shirley, W. E. Callahan** and **P. Grafe**, of Los Angeles, Calif., are engaged in building airports in Honolulu, T. H., for $1,799,000.

HIGHWAYS AND BRIDGES

Among recent highway and bridge contract awards are the following: Arkansas: $287,785 to **D. F. Jones Construction Co.**, Little Rock. California: $700,000 to **Radich & Brown**, of Burbank. Louisiana: $535,437 to **Central Construction Co.**, of Monroe; $279,147 to **T. L. James & Co.**, of Ruston. North Carolina: $195,063 to **L. Ellis**, of Greensboro. New York: $237,095 to **John Arborio, Inc.**, of Poughkeepsie; $198,623 to **Holmes & Murphy**, of Orchard Park; $478,437 to **Andrew Weston Co Inc.**, of Woodmere; $234,167 to **H. E. Bunce**, of Sayre, Pa.; $204,813 to **Louis Longhi & Son**, of Torrington, Conn. Ohio: $348,787 to **Lewis & Friesinger & Co.**, of Ann Arbor, Mich. Pennsylvania: $462,280 to **H. J. Williams Co., Inc.**, of York; $656,565 to **Holmes Construction Co.**, of Wooster, Ohio. Quebec, Canada: $364,400 to **Les Enterprises de Construction de Quebec, Ltd.**, of Montreal; $664,141 to **H. J. O'Connell, Ltd.**, of Montreal. Tennessee: $312,396 to **H. E. Wolfe Construction Co.**, of St. Augustine, Fla. Wisconsin: $352,695 to **A. B. Lynch Co.**, of Milwaukee.

In Louisiana, **Brown & Root, Inc.**, of Houston, Tex., was awarded contract to construct reinforced-concrete trestles on timber foundation piles, at cost of $2,198,388. **Tully & Di Napoli, Inc.**, received grade crossing elimination contract in Brooklyn, N. Y., for $2,415,519. In Chicago, Ill., contract for bridge superstructure over Chicago River, went to **Overland Construction Co.**, local contractor, at price of $1,276,848. Successful bidders for substructure of Mississippi River bridge were **Ferd Robes Construction Co.** and **LaCrosse Dredging Co.**, of Burlington and LaCrosse, Wis., respectively, with bid of $831,895.

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The HOW of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How **EXTERIOR VARIATIONS** were obtained in houses using single floor plan. —p. 42

How **CONCRETE BLOCK HOUSES** were reinforced to withstand storms. —p. 43

How **AIR-SHOT CONCRETE** was applied to exterior walls of steel-frame houses. —p. 43

How **GUIDE WIRES** enabled workmen to hold straight lines in finishing air-shot concrete surfaces. —p. 44

How **PREFABRICATED STEEL FRAMING** with nailing feature was used in house construction. —p. 45

How **STEEL ARCH BRIDGE** of 950-ft. span was erected without falsework. —p. 46

How **SAFETY NET** protected ironworkers against falls from steel arch bridge. —p. 48

How **TRACTOR-MOUNTED BOOM** laid water pipe in permanent Army tent camp. —p. 50

How **TRAVELING SCAFFOLD** aided electricians installing wiring for permanent tents. —p. 51

How **FIELD WELDING SHOP** built concreting equipment for Shasta dam. —p. 54

How **MACHINE PARTS** are built up and hard-faced by welding. —p. 55

How **EQUIPMENT MAINTENANCE** is facilitated by welding outfits at Friant dam. —p. 55

How **CANTILEVER FORMS** eliminate struts and ties on inside face of dam forms. —p. 58

How **LOG-LOADING CRANE** handled long sticks by heeling them against reinforced boom. —p. 58

How **CORRUGATING TOOL** scored surfaces of light-reflecting curb. —p. 58

How **SPECIAL OXYACETYLENE TORCH** removed rust and scale from steel before painting. —p. 59

How **SAFETY HOOD** on scarifier prevents accidents to man's foot when tripping lever. —p. 59

How **HAND SPRAYS** applied asphalt for penetration course along covered curbs. —p. 61

How **VERTICAL REINFORCING BARS** were welded in bridge piers more than 350 ft. high. —p. 62

How **TOWER ELEVATOR** raised concrete for placement in tall bridge piers. —p. 63

How **LARGE BRICK UNITS** 8 in. square were laid in reinforced pavement. —p. 64

How **WELDED PINS AND HOOKS** on tractor-scraper units increased scraper loads. —p. 65

How **ELECTRIC DRILL** cut holes for anchor rods in butts of driven piles. —p. 67

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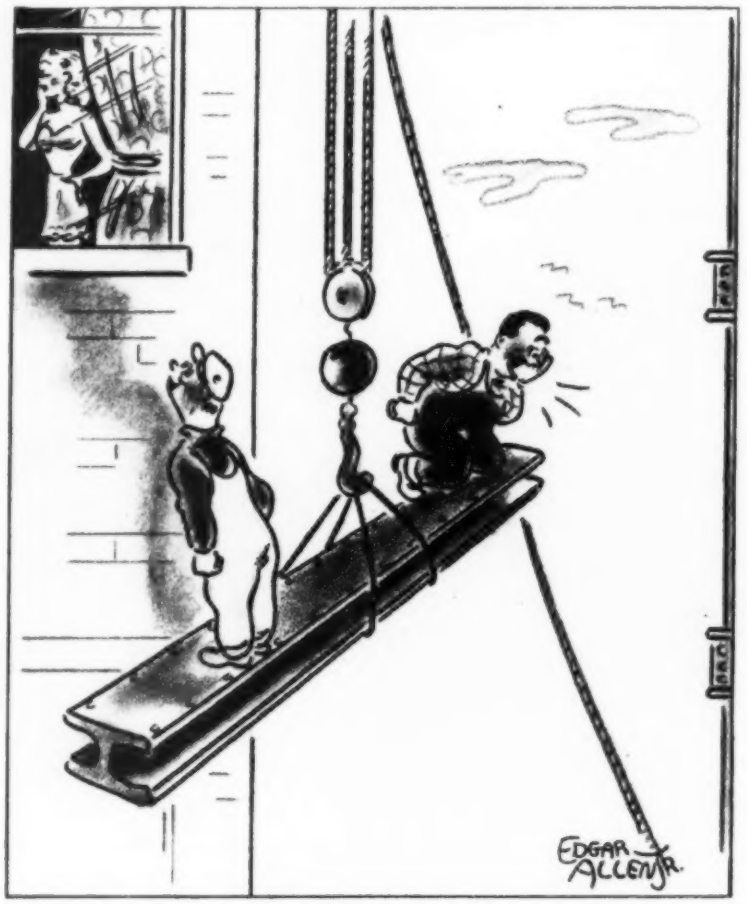
THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS

"They had an argument and came to a parting of the ways!"

"It's slippery today!"



"Say Murphy! Can't you raise this thing a bit?"

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WITH rising form costs, 'Incor's dependable overnight service strength is more important than ever. Because 'Incor' permits top-speed construction schedules with 50% to 60% less forms.

With 'Incor', you pour concrete one day, strip forms the next, so forms are available for re-use at least 3 days sooner. Thus, one form-set with 'Incor' produces the same construction speed as two or three sets usually do.

That means top-speed erection, at minimum cost of concrete in place—because the extra cost of 'Incor' is usually only a fraction of the cost of the extra forms needed to match 'Incor' schedules.

Use 'Incor'* for maximum speed at minimum cost —on one- and two-story structures as well as multi-story buildings. Write for copy of "Cutting Concrete Costs." Lone Star Cement Corporation, Room 2261, 342 Madison Avenue, New York.

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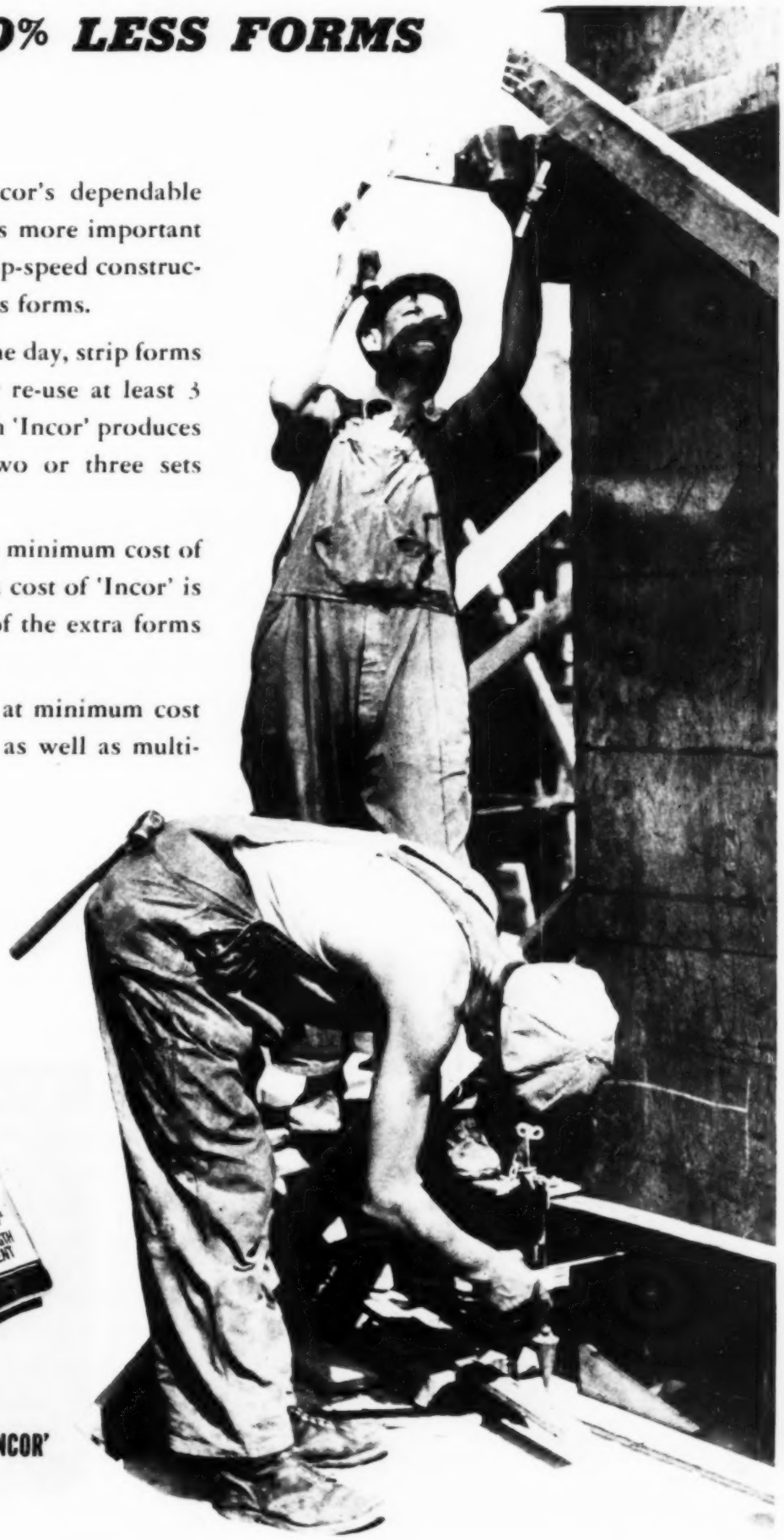

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LOW COST EMERGENCY DEFENSE WORK CALLS FOR TIMBER

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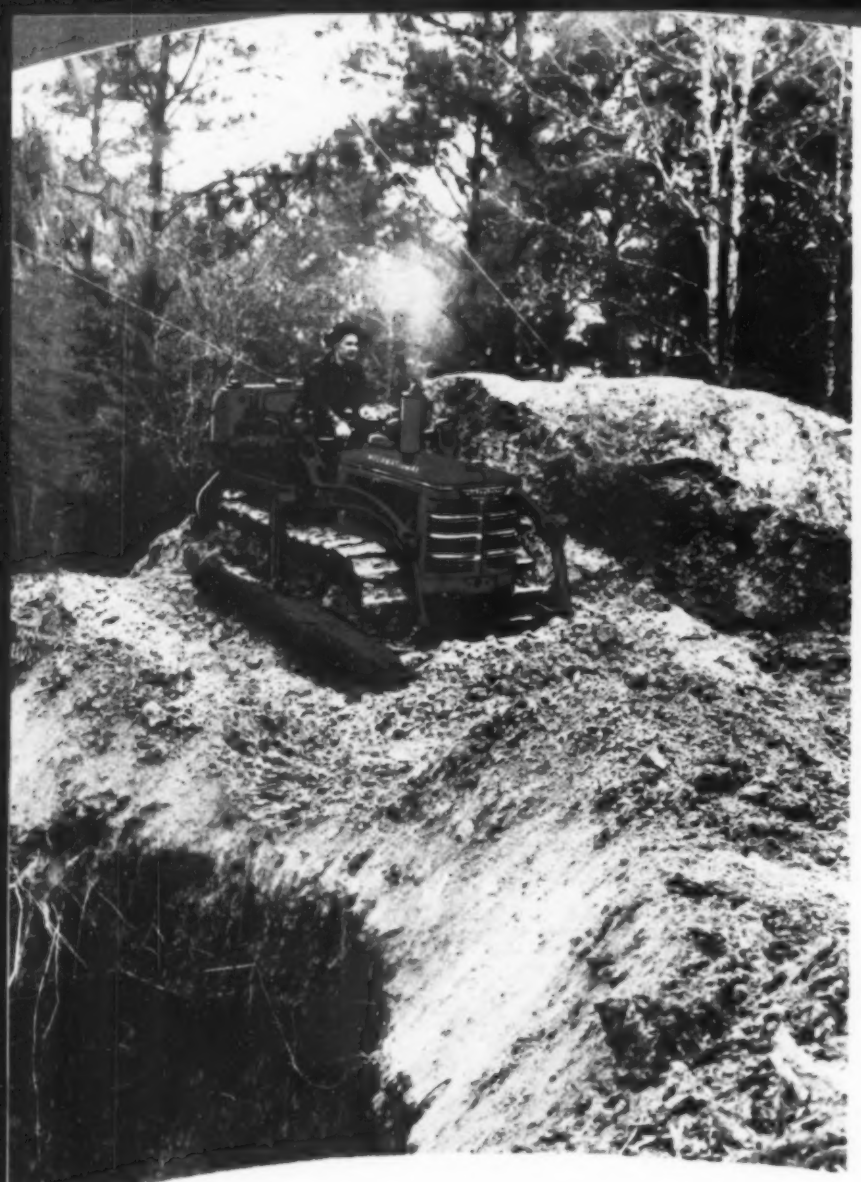

UPPER LEFT: Trees, ravines, steep grades—and an International TD-6 Diesel TracTracTor with bullgrader. The job: storm sewer construction; 7,500 yards of dirt to be excavated.

ABOVE: Carving a new road through California woods with a TD-14 Diesel and cable-operated bullgrader. "Easy to operate, lots of power," says operator. Output of this tractor and bullgrader combination is 1,000 yds. per 10-hour day. Fuel used: 2 gallons an hour.

LEFT: Stripping down a high bank. The big International TD-18 is furnishing economical, sure-footed power. The scraper has 10 cubic yard (heaped) capacity.

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TRACTOR SERVICE "Bases" COAST TO COAST

The full line of International Industrial Power, sold at 102 International Harvester branches in United States and Canada and by dealers from coast to coast, includes:

TracTracTors (crawlers)—7 models: 4 Diesels (TD-6, TD-9, TD-14, TD-18) and 3 carburetor-type (T-6, T-9, T-14).

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TRACTORS NEED "BASES," whether they are working for Uncle Sam or for you.

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180 North Michigan Avenue Chicago, Illinois

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Add to these proved advantages the speed of the Link-Belt Speeder Rapid Boom Hoist and you have a crane that surpasses even your most exacting demands.

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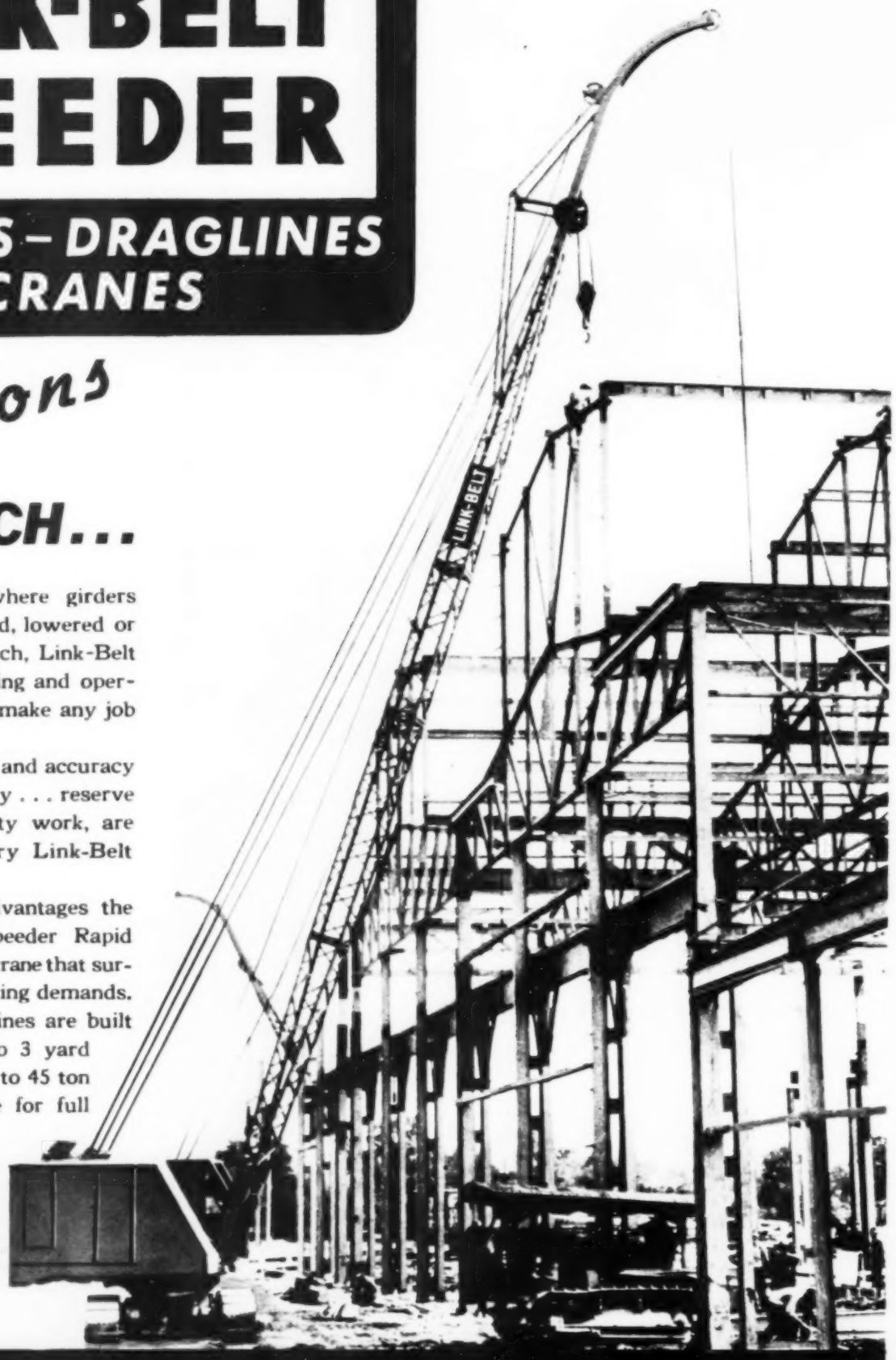

Link-Belt Speeder LS-100 Crane with 70 ft. boom and 15 ft. jib extension. Capacity 14 ton. Owned by The Austin Company, Cleveland, Ohio

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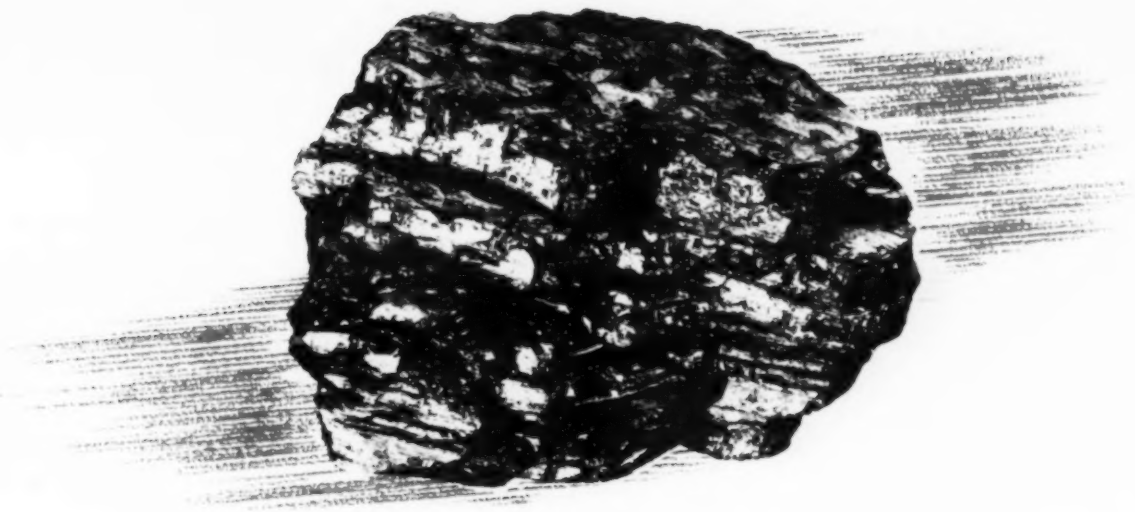

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Speed—economy—safety—are basic essentials to American industry today. If you could find a coal with 75% more BTU—you would be glad to pay a premium to get it. Because it would give you more steam, power, economy.

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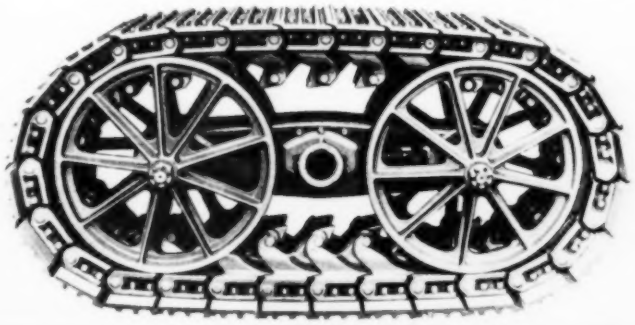

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YOUR heavy loads need never bog down. Athey Forged-Trak Wheels distribute weights over a wide track area, enabling you to maintain consistent speed and mobility under practically all ground conditions.

Athey Wheels roll easily on rails, raised well above dirt and obstructions—like a railroad track. Clean, frictionless, rolling surfaces reduce wear, save repair bills, cut hauling costs. Use them where heavy materials must move on schedule.

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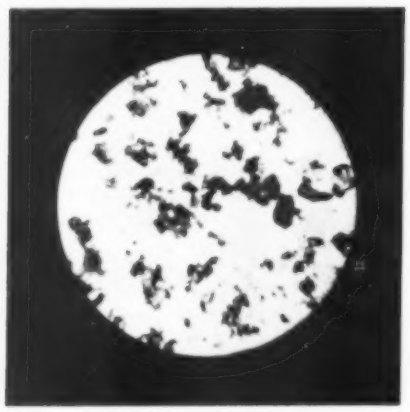
CEMENT DISPERSION

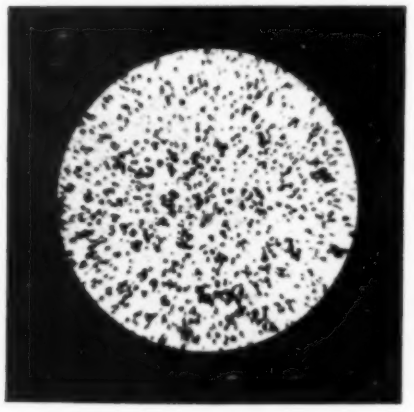
with POZZOLITH *gives* *Portland Cement*

MAXIMUM EFFICIENCY



UNDISPERSED
Cement in water in its normal flocculated condition.

Photomicrographs — Magnification 300



DISPERSED
Cement in the dispersed condition produced by adding a dispersing agent.

Portland cement is one of the valued inventions of mankind. The vast acreage of concrete is ample testimony to its widespread utility. But due to flocculation, it does not realize, unaided, its full possibilities.

Authorities have long known that dispersion of cement particles would greatly increase the efficiency of the cement, and augment its durability.

The discovery by the Master Builders Research Laboratories in 1930 of a practicable cement dispersing agent and its incorporation in Pozzolith made possible for the first time the application of dispersion to all types of hydraulic cement.

The past decade, devoted to introducing Pozzolith and proving its value in actual construction to engineers, contractors and owners, has firmly established its validity. The wide use of Pozzolith today, in hundreds of small private projects as well as giant defense works, is the natural consequence of this ten year record of successful performance. Contractors and builders in every field are now using Pozzolith because they know it assures them these 5 great advantages —

1. Durability increased 50% or more.
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3. Water reduction — up to 20% — slump increased 150% or more for given water ratio.
4. Increased water-tightness — 20% or more reduction in absorption and permeability.
5. Reduced bleeding and segregation.

SPEED AND ECONOMY—

Important to all contractors and builders is the fact that in addition to the above advantages Pozzolith speeds up the job but adds no increased over-all cost and in many cases substantial savings are made.

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4. The Erie Railroad, 9 projects since 1930.
5. The Union Pacific Railroad, 8 projects since 1930.
6. The Santa Fe Railroad, 4 projects since 1930.
7. Morris Knowles, Inc., Pittsburgh, Pennsylvania, 7 projects since 1930.
8. Burgess & Niple, Columbus, Ohio, 9 projects since 1930.
9. Robert & Co., Atlanta, Georgia, 15 projects since 1930.
10. Marsh, Smith & Powell, Los Angeles, California, 12 projects since 1930.

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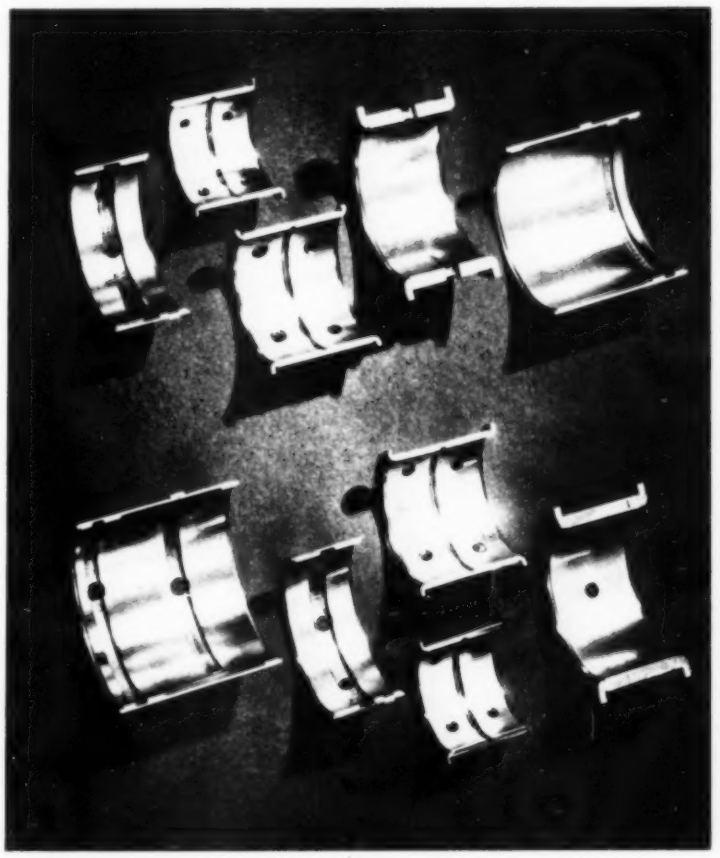
11. Ravenna Ordnance Depot, Ravenna, Ohio, over 740,000 pounds used in exposed concrete.
12. Iowa Ordnance Depot, Burlington, Iowa, over 200,000 pounds to date in igloos and other work.
13. Douglas Aircraft Co., Inc., Long Beach, California, over 220,000 pounds in structural concrete.
14. The Aluminum Corporation, over 1,000,000 pounds used in several projects in Canada and U. S. A.

Numerous references from all districts sent on request.

MASTER BUILDERS

Happy Days for your

MODERN BEARINGS



TUNE IN: "Millions for Defense." All-Star Radio Program. Every Wednesday Night, CBS. 9:00 E.D.T., 8:00 E.S.T.; 8:00 C.D.T., 7:00 C.S.T.; 6:00 M.S.T.; 5:00 P.S.T.

TO MAKE GOOD in modern heavy-duty bus and truck engines with their greater power output, higher speeds and temperatures, modern precision-type engine bearings must be protected against oil corrosion by lubricants made especially for this service.

Fleet operators everywhere are experiencing signal success with modern bearings lubricated with *TEXACO 303 MOTOR OIL.*

The exclusive use of *Texaco 303 Motor Oil* protects modern precision-type bearings from oil corrosion, and keeps engines in excellent operating condition so that time between inspections and overhauls is greatly lengthened . . . resulting in *lower maintenance costs.*

The outstanding performance that has made Texaco preferred in the fields listed in the panel has also made it preferred on many of the larger construction jobs everywhere.

These Texaco users enjoy many benefits that can also be yours. A Texaco Automotive Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

TEXACO

REG. T.M.

TEXACO Lubricants and Fuels

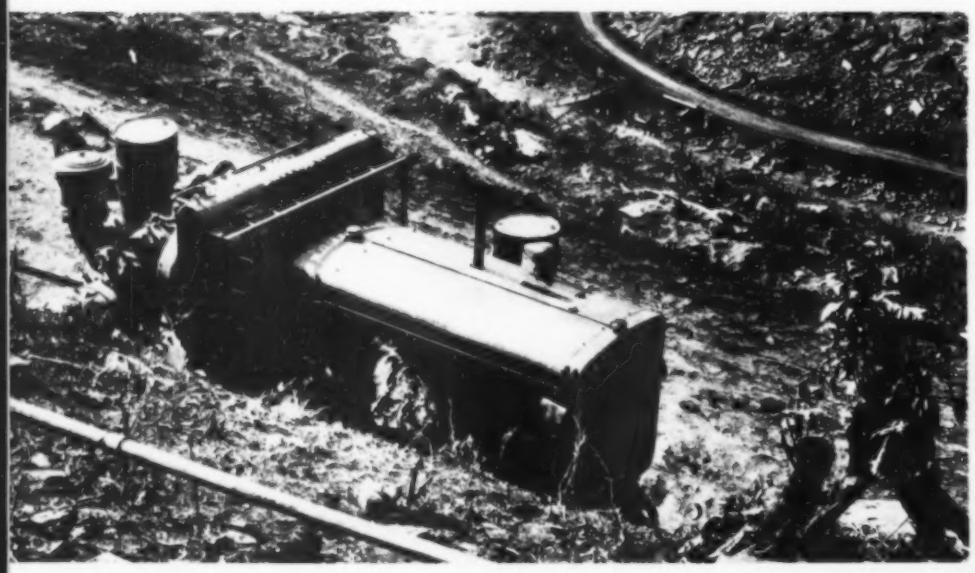
FOR ALL CONTRACTORS' EQUIPMENT

FOR *all-around* SAVINGS...

MAKE IT

"CATERPILLAR" DIESEL *all around!*

• A pair of 7-yard Hug trucks and a Lorain shovel—all powered by "Caterpillar" Diesel Engines! Working at Raton Pass, New Mexico. Cook and Ransom Construction Company and Sanders Bros. Construction Company are the owners of this equipment.



• Nantahala Dam, Nantahala, North Carolina. Sullivan compressor being driven by a "Caterpillar" Diesel D13000 Engine. Owned by the Utah Construction Company, Ogden, Utah.

• Two "Caterpillar" Diesel Engines powering General Electric arc welders on the Cherokee Dam project, Tennessee.

EVERY cost item in powering your engine-driven equipment can be favorably reduced by "Caterpillar" Diesels!

Take fuel, first. Instead of using the higher priced, "high-speed" Diesel fuels, "Caterpillar" Diesels run on such lower cost low grades as No. 3 domestic burner oil—giving you *even more economy* than the usual Diesel fuel economy! The "Caterpillar" Diesel fuel system is a time-saver, too, because it's absolutely free of operating adjustments. Start these engines going and they stay going, 24 hours a day—without the need of tinkering to maintain full-powered output!

Now, consider the long, useful life of a "Caterpillar" Diesel—and its importance in writing-off your original investment. The *Superfinished* "Caterpillar" crankshaft journals are made to within a few millionths of an inch of *absolute smoothness* so they fit more accurately and retain their accurate fit longer. And the "Hi-Electro" hardening used by "Caterpillar" gives the cylinder liners, crankshaft and other parts *more wear-resistance* than can be had by any other practical heat-treatment method!

The serviceability of this heavy-duty construction is guarded—*and lengthened*—by such "Caterpillar" features as the full-pressure lubrication system . . . absorbent and metal-edge type oil filters . . . air-type oil cooler and complete sealing against harmful dirt!

All this not only means long-term service—but steady, day-to-day trouble-free operation that helps you keep up to schedule. And when you need mechanical assistance or repair parts, you've got a Diesel engine service organization that's *without equal,* ready to come to your rescue! These are some of the good reasons it will pay you to

insist on "Caterpillar" Diesel Power in the engine-driven equipment you buy!

• • •

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

• Pioneer crusher, near Mesa, Arizona, being driven by a "Caterpillar" Diesel D13000 Engine. Owned by Wallace & Wallace, Cochise, Arizona.

CATERPILLAR
REG. U.S. PAT. OFF.
DIESEL
ENGINES AND ELECTRIC SETS
TRACK-TYPE TRACTORS
ROAD MACHINERY
ESSENTIAL TO NATIONAL DEFENSE
is *fast, dependable earth-moving power*—for the construction of roads, airports, cantonments, naval bases and munitions plants. Defense fronts all!

SAVES YOU AND BECAUSE...

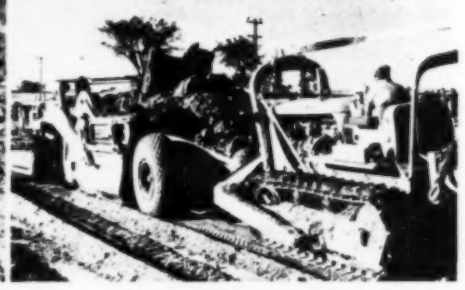
MONARCH PRE-FORMED is made from 2 kinds of wire!

INNER WIRES ARE EXTREMELY FLEXIBLE. They're drawn in a special way to make them extra strong, extra pliable. They're improved plow steel too. These wires are the reserve strength of Monarch Whyte Strand rope. They bend easily over your sheaves and drums.

OUTER WIRES ARE EXTRA TOUGH
These wires are improved plow steel, specially drawn for outside service. They are the rope's "first line of defense." That's why we give them a TOUGH abrasion resisting skin . . . a good reason why Monarch Whyte Strand ropes stand up so well on shovels, draglines, scrapers, and other equipment.

You get this EXTRA, TOO!
Around every wire in a Monarch Whyte Strand rope is a special lubricant which protects unseen, inside surfaces against corrosion and friction.

Why not let us give you the benefit of our experience on hundreds of wire rope installations like yours? There's no obligation of course. Write us, or call in your Macwhyte distributor for a rope recommendation.



NO. 553-C

MACWHYTE EXCAVATOR ROPES

TESTED INTERNALLY LUBRICATED PROVED

The correct ropes for your equipment

PRE-FORMED FOR BEST PERFORMANCE

MACWHYTE COMPANY
2941 Fourteenth Avenue, Kenosha, Wisconsin

Manufacturers of wire rope to meet every need
left-&-right lay braided slings
Stainless Steel wire rope — Aircraft Cables,
Aircraft tie rods and 'Safe-Lock' Swaged Terminals

New York · Pittsburgh · Chicago · Ft. Worth
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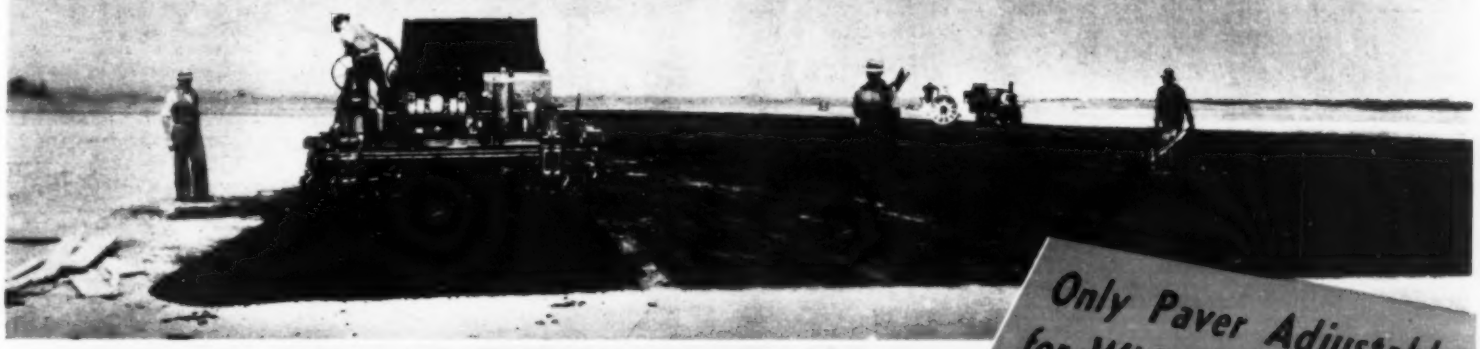
Distributors throughout the U. S. A.

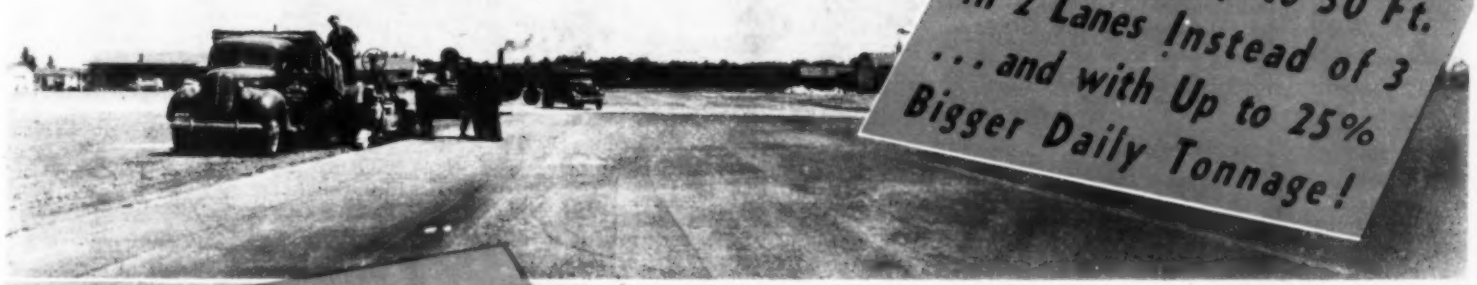
THE AIRPORT PAVER OF TODAY

thruout the U.S. and Canada



On Canada's Camp Borden Training Centre Runways

Only Paver Adjustable for Widths up to 15 Ft. --- Can Lay Up to 30 Ft. in 2 Lanes Instead of 3 ... and with Up to 25% Bigger Daily Tonnage!



17 Ft. Straight Edge "Equalizers" Insure Smoother Surface . . . (Can Lay Material Flush to Curb, Header or Form!)

Paving San Pedro, California, Airport

From the days when Jaeger Bituminous Pavers, equipped with lights and heated screeds, worked late hours to complete the British Government's Botwood Airport in Newfoundland, *where runways equal 190 miles of 20 ft. road,* Jaeger has been the overwhelming favorite of Dominion engineers and contractors. In the U. S., from Portland, Maine to San Pedro and other California fields, the Jaeger Paver has proved its outstanding advantages for air field construction: TELESCOPIC ADJUSTABILITY FROM 9 TO 15 FT. — WIDER, THEREFORE FEWER, LANES — INCREASED TONNAGE — SMOOTHNESS OF SURFACE EQUIVALENT TO FORM WORK — ABILITY TO LAY FLUSH TO CURB, CONCRETE HEADER OR RETENTION FORM — HEATED SCREEDS THAT PERMIT YOU TO START EARLIER, MOVE FASTER, WORK LATER.

Send for Catalog describing these and other important features for high production paving of airports, highways, city streets. THE JAEGER MACHINE CO., 800 Dublin Ave., Columbus, Ohio.

WORLD'S LARGEST MANUFACTURER of BITUMINOUS and CONCRETE SPREADING and FINISHING EQUIPMENT—Bituminous Pavers, Spreaders, Widening Spreaders - Concrete Finishers for Slab and Widening, Screw Spreaders - Auto-Pavers - Concrete, Plaster, Mortar Mixers - Pumps - Hoists - Towers

JAEGER ADJUSTABLE STREET, HIGHWAY AND AIRPORT PAVER

The Real Question is
Can You Afford *Not* to Use Atlas Manasite Detonators?

In 1938—when Atlas Manasite Detonators were introduced as an important step forward in safer blasting—people naturally asked, "Are they dependable?"

Time has given the answer. In field after field—mining, quarrying, construction, agriculture—Atlas Manasite Detonators have been tried, tested, and approved. Blasters have found that they offer reduced sensitivity to impact and friction—with no sacrifice in efficiency, and no increase in cost.

Today, with the dependability of Atlas Manasite proved by over 100 million detonators used, the real question is—Can you afford *not* to use this advance in greater safety?

ATLAS MANASITE DETONATORS

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. · Offices in principal cities · Cable Address—Atpowco

If you have an Earth-Moving Job, LAPLANT-CHOATE Builds Equipment for it . . to save You Time, Effort and Money!

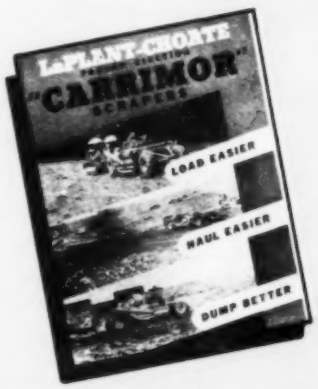
"THEY MOVE MORE EARTH THAN YOU CLAIM"

That's what Supt. J. F. Geary tells us about his Two . . . .

LAPLANT-CHOATE

FORCED EJECTION TYPE

CARRIMOR SCRAPERS



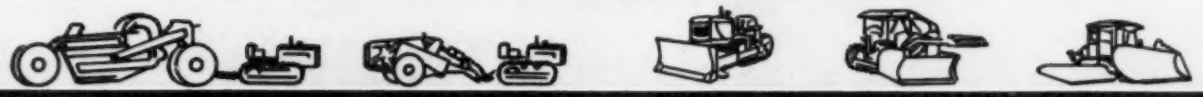
FREE—Forced Ejection Type Carrimor Booklet . . .

Write to LaPlant-Choate Manufacturing Company, Cedar Rapids, Iowa, or your nearest Caterpillar Dealer today, for this booklet.

On this 225,000 yard job, moving sticky yellow clay and rock in the hilly country near Springbrook, Iowa, LaPlant-Choate Carrimor Scrapers are proving their superiority. The job is re-routing 5 miles of Iowa Highway #113 and part of the equipment consists of two C-86 Carrimor Scrapers and a LaPlant-Choate Pusher. Easy loading and transporting and clean dumping are outstanding features. Superintendent J. F. Geary of the E. M. Duesenberg Company, Inc., Clear Lake, Iowa, says: "Before we bought these scrapers I was pretty well sold on another well-known outfit. Since we got them I know they are more than we expected. They move more earth than you claim for them. We are all convinced of that. They will run circles around any others that we have." In any country and under any conditions, LaPlant-Choate equipment gets the job done at lower operating costs.

LAPLANT-CHOATE MANUFACTURING CO. Inc.

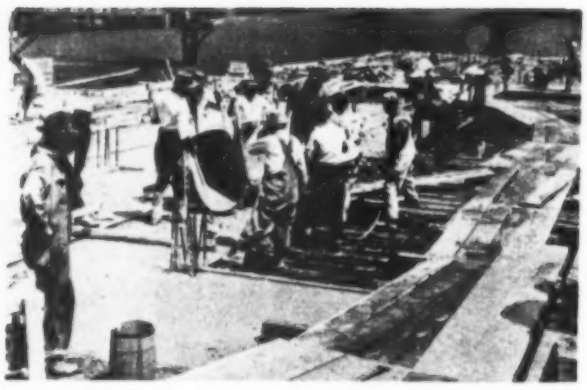
CEDAR RAPIDS, IOWA.



EARTH MOVING · · · · LAND CLEARING · · · · SNOW REMOVAL

- **HOSPITAL BUILDING:** Blue Ridge Sanitorium, Charlottesville, Va.
- **ASSOCIATE ARCHITECTS:** L. A. Brown, W. E. Stainbach, Charlottesville, Va.
- **CONTRACTOR:** Goode Construction Co., Charlotte, N. C.

How to save days *AND* dollars!



• An unforeseen delay had put this job behind schedule. Knowing all the safe short-cuts to time-saving, the contractor O. K.'d a switch to Lehigh Early Strength Cement for the first floor and columns.

• Instead of having to wait 21 days before forms could be removed, only 7 days were required. According to Mr. Goode, the use of Lehigh Early Strength Cement not only helped to put the job back on schedule, but also saved about $2000 in overhead, superintendent's salary, labor costs and forms.

• Thanks to the ability of Lehigh Early Strength Cement to bring concrete to service strength in one-third to one-fifth normal time, a contractor can often make up time that would otherwise be irretrievably lost. Often, too, this is more important than the mere money-saving that accompanies its use.

• Incidentally, Lehigh Early Strength Cement . . . besides bringing quick strength to concrete . . . makes denser, better concrete. The Lehigh Service Department will gladly answer any inquiries.

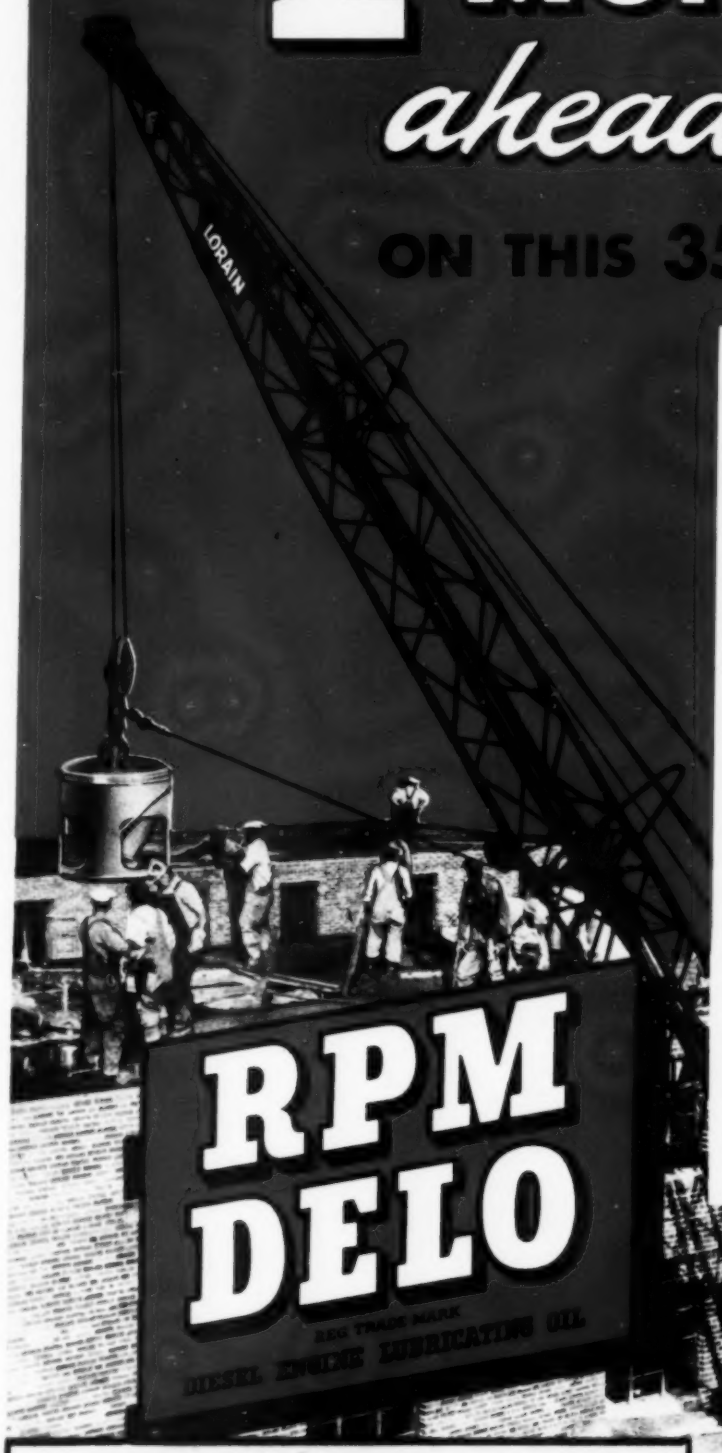
Lehigh **EARLY STRENGTH CEMENT**

for **service-strength** concrete in a **hurry**

LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. · CHICAGO, ILL. · SPOKANE, WASH.

"2 MONTHS *ahead of schedule"*

ON THIS 35 MILLION DOLLAR JOB



SWEET NEWS—THE HUNKIN-CONKEY CONSTRUCTION COMPANY of Cleveland is 'way ahead of time on the big U. S. shell-loading plant at Ravenna, Ohio.

"With RPM DELO—breakdowns are no longer present"—that's their report on eleven Thew Lorain shovels and 87 other pieces of Diesel equipment working a 24-hour day in rock and shale—4 million yards of it. If you ever had Diesel trouble—look at this list—all 98 pieces RPM DELO lubricated—all working fine:

63 Caterpillar "Cats"
6 small Diesel locomotives (Caterpillars)
5 Northwest shovels (Murphy Diesels)
1 Marion Shovel
11 Thew Shovels (Caterpillar Diesels)
12 Air Compressors

There are 116 miles of railroad, 70 miles of highway and 900 buildings in the contract—but with RPM DELO on the job "former lubricating difficulties have disappeared."

"Two months ahead of schedule" is a quick way of saying RPM DELO—and no breakdowns! No sludge trouble—no ring-sticking—engine-wear lower than ever before!

ORDER RPM DELO *Unequaled* FOR YOUR DIESELS

Approved by the makers of over 95% of the installed Diesel horsepower in America, RPM DELO is marketed under the following names:

RPM DELO
Kyso RPM DELO • Sohio RPM DELO
Signal RPM DELO • Caltex RPM DELO
Imperial RPM DELO

Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your locality.

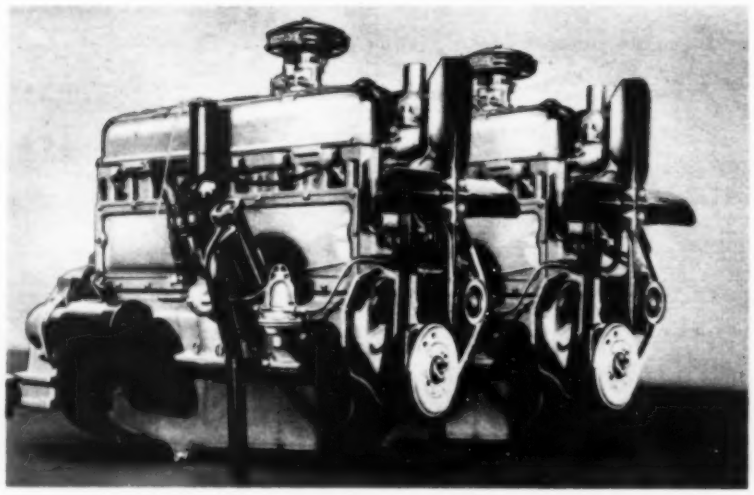
STANDARD OIL COMPANY OF CALIFORNIA

GMC OUTPULLS ANY TRUCK ON WHEELS

AND GMC PRICES ARE LOW!

Now, two sizes of GMC Super-Duty Engines are offered to 1½-ton truck users. GMC's regular 228 cu. in. engine has proved gas savings of 15% to 40% over comparable trucks, according to owners' own statements. GMC's new 236 cu. in. engine is the *strongest puller* available in any 1½-ton truck. GMC's revolutionary combustion chambers and Turbo-Top Pistons give you *greatest pulling power* and outstanding economy in every engine size in General Motors Trucks.

Our own YMAC Time Payment Plan assures you of lowest available rates



THE TRUCK OF VALUE

GMC TRUCKS

GASOLINE — DIESEL

2 POWERFUL ENGINES for 1½-TON GMCs

- *93 Horsepower "228"—183.5 ft.-lbs. Max. Torque*
- *97 Horsepower "236"—192.5 ft.-lbs. Max. Torque*

This is the famous 2½-ton 6-Wheel-Drive GMC so widely used by the Army. Its design is basically the same as regular 6-Wheel-Drive GMCs.

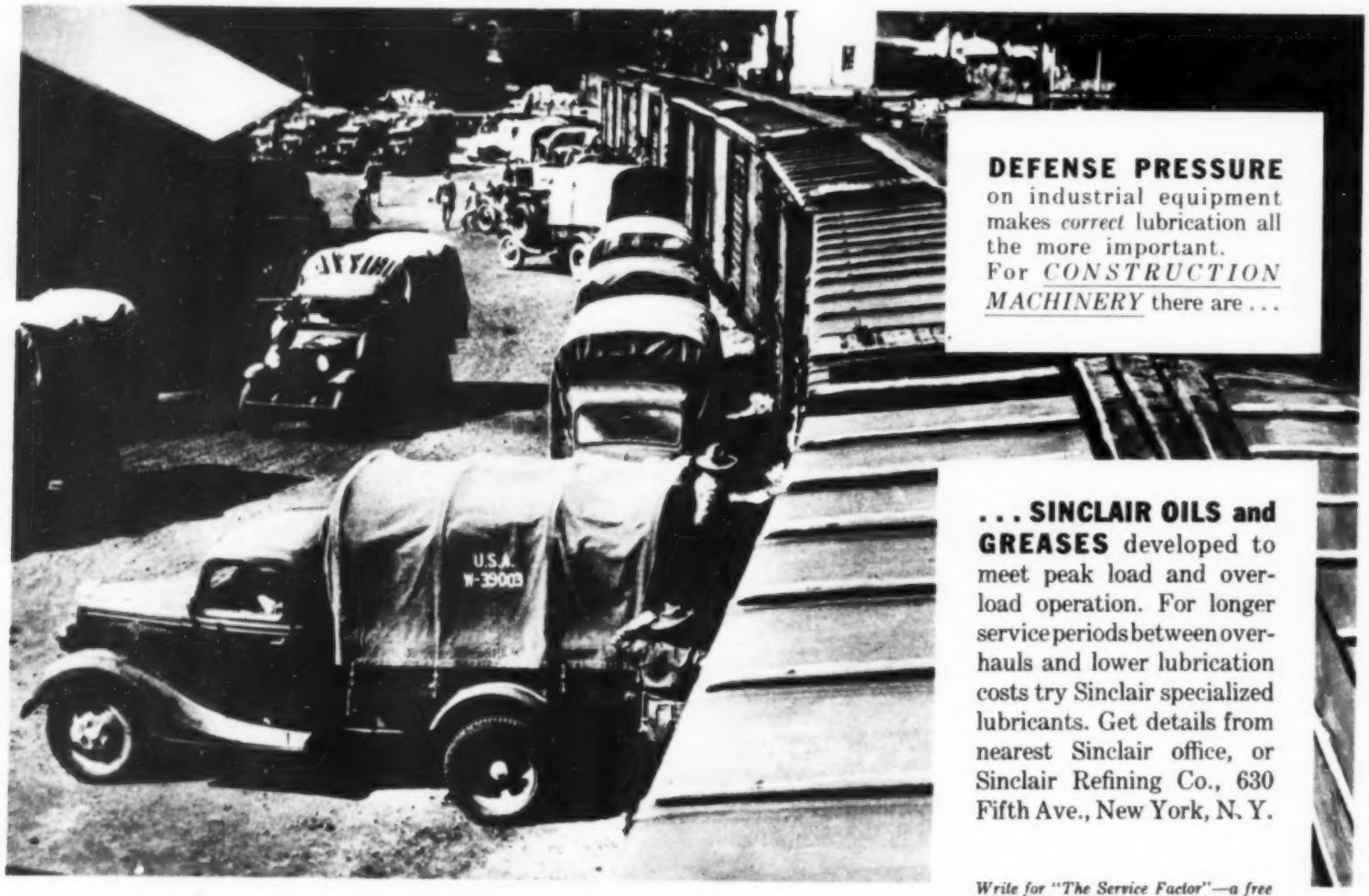
BUY for the TOUGH DIGGING and you won't have to worry about output in DIRT!
M. K. Co.
GASOLINE
ELECTRIC
DIESEL
OIL
Built in a range of 18 SIZES 3/8 yd. capacity and Larger

NORTHWEST

NORTHWEST ENGINEERING COMPANY

1728 Steger Building, 28 East Jackson Boulevard, Chicago, Ill.

EASY digging never worried any contractor. Any shovel will handle dirt! But even the man who begins on dirt today may find he's got a rock contract tomorrow. Then that Northwest Welded Boom (and no Northwest Welded Boom has ever failed), those welded dipper sticks tied together with a cap casting that work as a unit, the Northwest Dual Independent Crowd that utilizes force other shovels waste, the Cushion Clutch, the "feather-touch" Clutch Control — all the advantages that have made Northwest so outstanding as a Rock Shovel become money makers. *Buy for the tough digging and the easy digging will take care of itself.*



DEFENSE PRESSURE on industrial equipment makes *correct* lubrication all the more important. For *CONSTRUCTION MACHINERY* there are . . .

. . . SINCLAIR OILS and GREASES developed to meet peak load and overload operation. For longer service periods between overhauls and lower lubrication costs try Sinclair specialized lubricants. Get details from nearest Sinclair office, or Sinclair Refining Co., 630 Fifth Ave., New York, N. Y.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

BUDA *Diesel-powered Bucyrus Erie shovel operated by Frank Mashuda Co., at Mt. Pleasant, Pa., with Sinclair oil and fuel.*

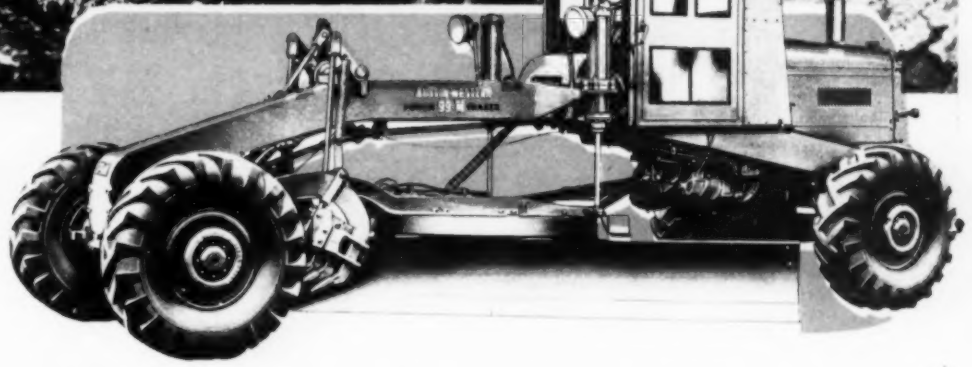
SINCLAIR LUBRICANTS-FUELS

SINCLAIR REFINING COMPANY (Inc.)

2540 West Cermak Road, Chicago • 10 West 51st Street, New York City • 1907 Grand Avenue, Kansas City • 573 West Peachtree Street, Atlanta • Fair Building, Ft. Worth

ANNOUNCING

THE A·W "99·M" POWER GRADER



A New

MONORAIL FRAME MACHINE EMBODYING ALL OUTSTANDING "99" ADVANTAGES

DON'T HANDICAP YOUR HORSEPOWER
A motor grader without power on the front wheels is like a draft horse with roller skates on his front feet.

● The New "99-M" with its monorail frame enables you to take the fullest advantage of All-Wheel Drive and All-Wheel Steer, on jobs you wouldn't think of tackling with a conventional motor grader. See the new "99-M" perform. Learn how many more jobs its live tractive weight and ease of control will help you clean up better . . . quicker . . . cheaper! THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois.

Austin-Western

Motor Graders • Loaders
Blade Graders
Elevating Graders
Hydraulic Scrapers
Crushing and Screening Plants

Cable Scrapers
Rollers • Roll-A-Planes
Motor Sweepers
Bituminous Distributors
Shovels and Cranes

Power shovel service at your door with

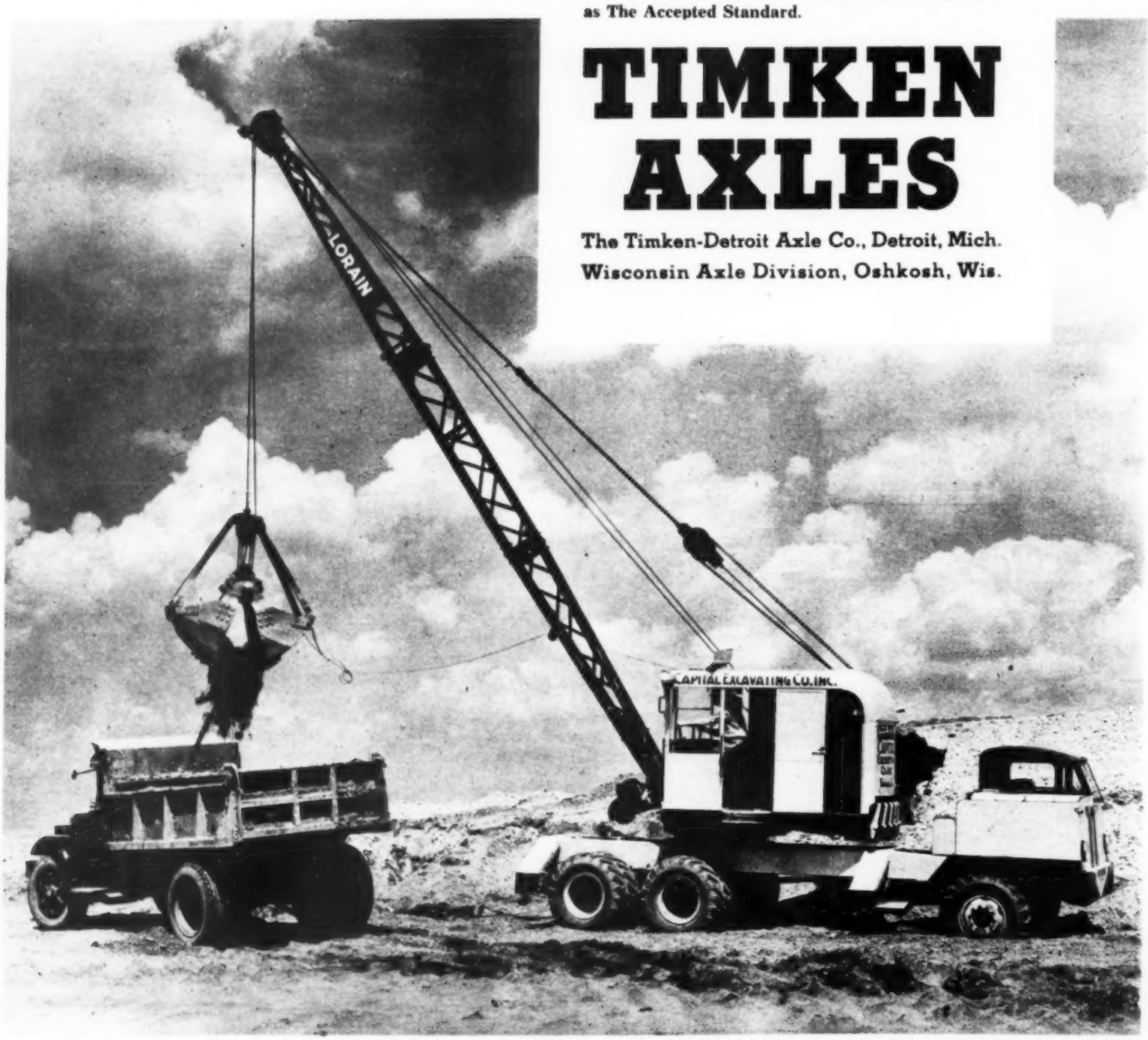
Timken "6-wheelers"

(Tandem Drive)

Hats off to Thew, makers of Lorain power shovels, and to other farsighted, progressive power shovel manufacturers! They've put real "get-up-and-go" into their products.

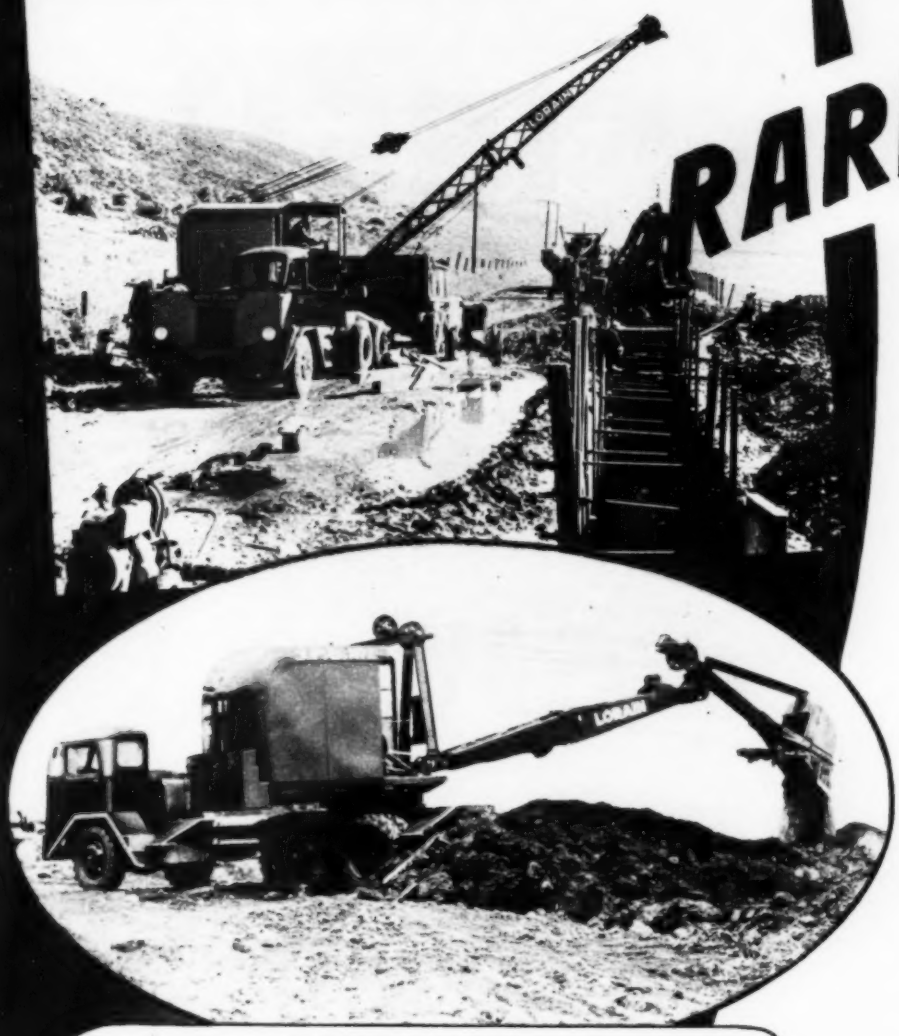
No longer is it necessary to figure days between jobs and unnecessary delays in getting around on the job. Sturdy shovels (cranes, too) mounted on special extra heavy chassis with Timken 6-Wheel Tandem Drive Axle Units speed over the highways —save time getting to and from each job—do each job better and faster, and literally bring power shovel service to your door at new low costs and with greater dependability.

That Timken Axles are a vital part of this new and important development is just another reason why Timken products are recognized everywhere as The Accepted Standard.



TIMKEN AXLES

The Timken-Detroit Axle Co., Detroit, Mich.
Wisconsin Axle Division, Oshkosh, Wis.



RARIN' to GO

AND READY FOR WORK

Here's the machine that's turning **waiting time** into **working time** on scores of rush jobs everywhere. The Mechanized Moto-Crane* has the next best thing to wings—a special Crane Carrier with 10 rubber-tired wheels. Whether you want to move 50 miles on the highways or 500 ft. through tough going, it's always rarin' to go—at speeds that cut "time in transit" to a minimum.

The Moto-Crane doesn't lose any of its speed and pep once it's on the job either. Center Drive design of turntable provides plenty of power, strength and capacity for handling heavy loads and tough digging. Ready convertibility to shovel, crane, dragline, clamshell or backdigger enables this unit to adapt itself quickly to changing job requirements.

Mechanized Moto-Cranes are available in three sizes. Write for new illustrated catalog today. See for yourself what a whale of a difference 10 rubber tires can make in time and money savings. **Trade Mark*

UNIVERSAL CRANE DIVISION
THE THEW SHOVEL COMPANY
LORAIN, OHIO

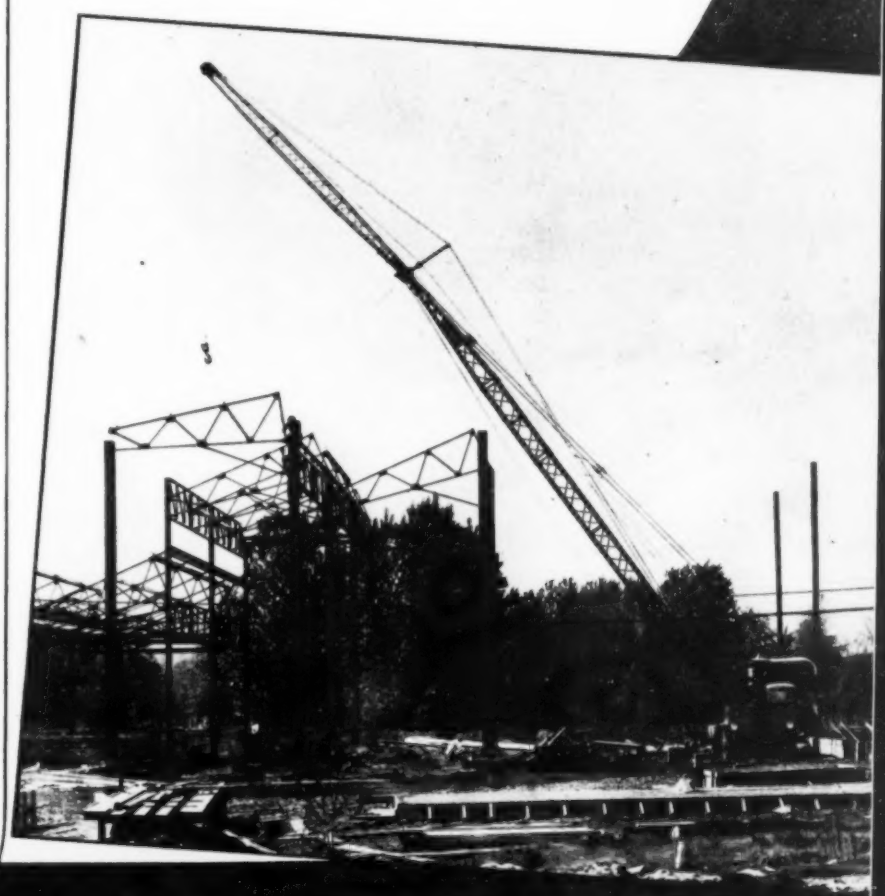
QUICK FACTS ABOUT

THE CRANE

1. Simplified Center Drive direct-to-the-point power application.
2. Balanced turntable design, to provide the greatest capacities per pound of weight.
3. Steel erector's precision boom hoist with positive power control of boom lowering.
4. 2-piece, pin-connected, all-welded boom with center sections and straight or gooseneck tips.
5. Cab type tagline which functions efficiently at all boom angles and digging depths.
6. Winch Head and Third Drum attachments.
7. Convertible to Dragline, Clamshell, Shovel, Backdigger.

THE CARRIER

1. 3-axle mounting on 10 rubber tires. Both tandem rear axles drive.
2. High speed transmission range for road travel—low range for tough going off road or on job.
3. Built of standard major unit parts available all over the country.
4. Close-coupled, 175" wheelbase for better maneuvering. Steering gear designed for soft ground travel.
5. Special chassis frame design which eliminates reinforcing.
6. 10 speeds forward—and 2 reverse. Unit will climb a 30% grade.
7. Rocker arm rear end replaces springs—gives flexibility for road travel—rigidity for operation.



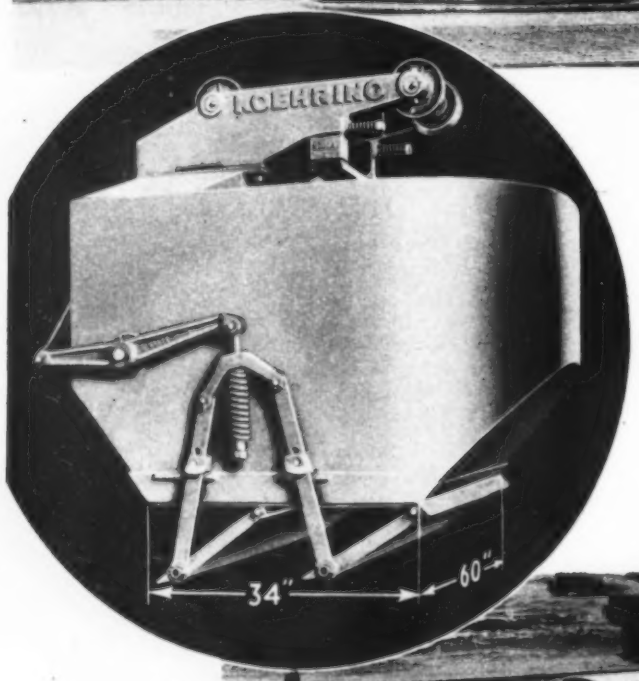
THEW CENTER DRIVE

UNIVERSAL LORAIN MOTO-CRANE

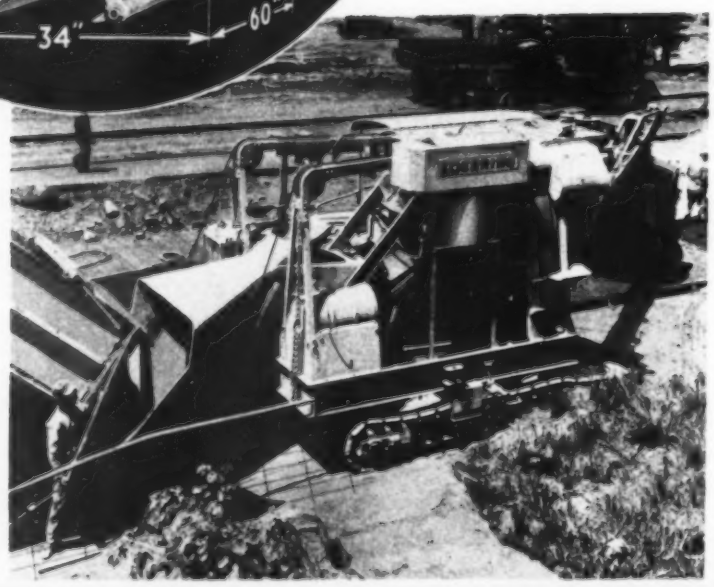
NO JOB TOO SMALL OR SHORT—NO JOB TOO BIG OR TOUGH

New 34-E SINGLE-BATCH!

Long boom can be swung to a 90° angle for non-tip pouring from the shoulder to grade. Air-controlled discharge chute is quick acting and positive.



Thirteen square feet of door opening permits high speed dumping and spreading.



Low overall height permits pouring and travel through underpass without dismantling.

Extra Large Opening For *Fast Free Spreading*

Two door distributing bucket has extra large opening . . . approximately 13 square feet . . . for fast, free flowing discharge of full batch. Both doors open same direction to provide full width of bucket bottom for easy and quick spreading.

Air controlled discharge chute is quick acting, positive and not affected by temperature changes. Air control is equally responsive at any time of the operating period. These Koehring features are only a few of the many improvements of the new Koehring 34-E Single-Batch paver . . . to provide increased speed of the batch cycle.

KOEHRING CO.
MILWAUKEE • WISCONSIN

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

WORLD'S LARGEST POUR

of Finished Cement Floor in Record Time!

"WHITEMAN" MACHINES finish 73,000 sq. ft. of 5 in. concrete floor in 12 hours and 15 minutes from time pour was started.

At the DOUGLAS AIRCRAFT plant, Long Beach, Calif., "WHITEMAN" machines finished all concrete floors for the Walker Construction Co. Here is what Mr. Frank W. Starr, General Superintendent, (who has finished over 1,500,000 sq. ft. of floor with "WHITEMAN" machines in the last four months), says about the performance of his "WHITEMAN" Finishers:

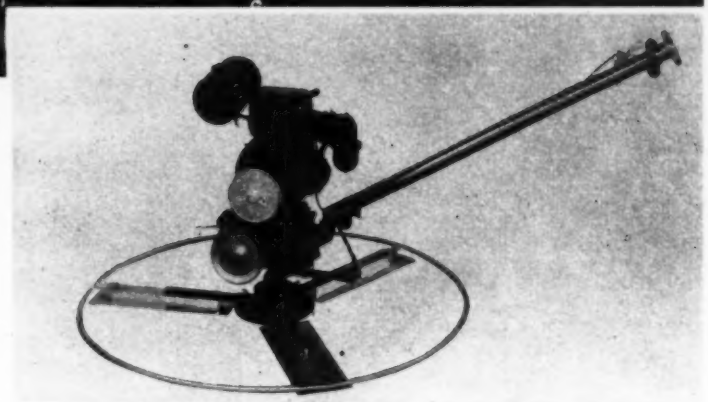
"This Float ('WHITEMAN' Cement Floor Finisher) performed exceptionally well, producing a very fine surface, and in addition to its excellent performance, cut the finishing costs . . . .

"On April 16, 1941, the mixing plant was started at 4:00 a.m. At 12:30 p.m. the plant was shut down and the pour finished. We put through 1234 cu. yd. of concrete, spreading an area of 73,000 sq. ft. of 5-in. concrete floor. At 4:15 p.m. the floor was finished completely. In view of the fact that the Master Builders Floor Hardener also was used in connection with the finish, it is my opinion that it would have been impossible to have finished that large area in this time without the aid of the Power Floats ('WHITEMAN' Finishers) and get the results we wanted—a level, hard finished floor."

Why not multiply the efficiency of your finishing crews with the "WHITEMAN" Precision Cement Floor Finisher? With either the gasoline or electric powered model you machine finish cement floors in minimum time—prevent even large areas from "getting away" from you. Results are: level, denser, more wear-resistant cement floors that will withstand every traffic requirement—AND AT LOWER COST.

Don't delay—Write NOW for the name of your nearest dealer.

WHITEMAN
MANUFACTURING COMPANY
3244 Casitas Avenue
Los Angeles, California



"Whiteman" Cement Floor Finisher — Gasoline Model

Here's how the "WHITEMAN" Floor Finisher Assures Better Floors at Lower Cost—

1. High Speed Finishing—you can cover 1,000 sq. ft. of floor in 15 minutes.
2. Large areas can be handled quickly — 73,000 sq. ft. at Douglas Plant machine finished in 12 hours and 15 minutes from time pour was started.
3. Your finishing crews accomplish more, because "WHITEMAN" Finishers eliminate slow, tedious back-breaking hand labor.
4. Floors don't "get away from you" when extra finishers aren't available.
5. Harder, denser surface results from the weight of the machine which compacts material, avoids laitance and water voids.
6. Uniformly level floors are assured by the broad sweep of the 48-in. diameter rotating trowels.

"WHITEMAN" Hand Grill TAMPER

makes Dense, Hard Floors Without Dry Topping

Dry topping is unnecessary with a good concrete mix, when you prepare the slab with this Hand Grill Tamper. The "WHITEMAN" Tamper knocks heavier aggregates down—leaves a "fat" sufficient for finish.

You get a denser floor with more even distribution of finer aggregates on the surface, due to the Grill action. This inexpensive, lightweight, collapsible and adjustable Tamper saves time and money on all types of surfaces. Write for full information.

Laying TEXACO Asphaltic Concrete pavement on half the width of South Main Street, Houston, while traffic uses base on other half. Note safety island dividing northbound and southbound traffic. Contractor: Gaylord Construction Company.

HOUSTON'S OUTSTANDING PAVING PROJECT OF 1940

As part of Houston's principal north-south arterial thoroughfare, South Main Street is one of the most heavily travelled streets in the South. The reconstruction of a substantial portion of South Main Street during 1940 was by far Houston's outstanding paving project of the year.

For the information of street and highway engineers, the pavement laid on this busy street of the Southwest's largest city was a 2-inch thickness of TEXACO Asphaltic Concrete, hot-mix type. TEXACO Asphaltic Concrete is well adapted to withstand the hard wear it will receive under South Main Street's continuous traffic. Because it is resilient, joint-free, highly skid-resistant and waterproof, it possesses great durability, its upkeep cost is small and it provides maximum driving safety.

Today, Houston is served by more than 1,000,000 square yards of TEXACO-paved streets.

To help you decide which of the types of Asphalt surface most economically meets your requirements, discuss the problem with a TEXACO engineer. You are welcome to the benefit of his experience, without obligation.

TEXACO ASPHALT

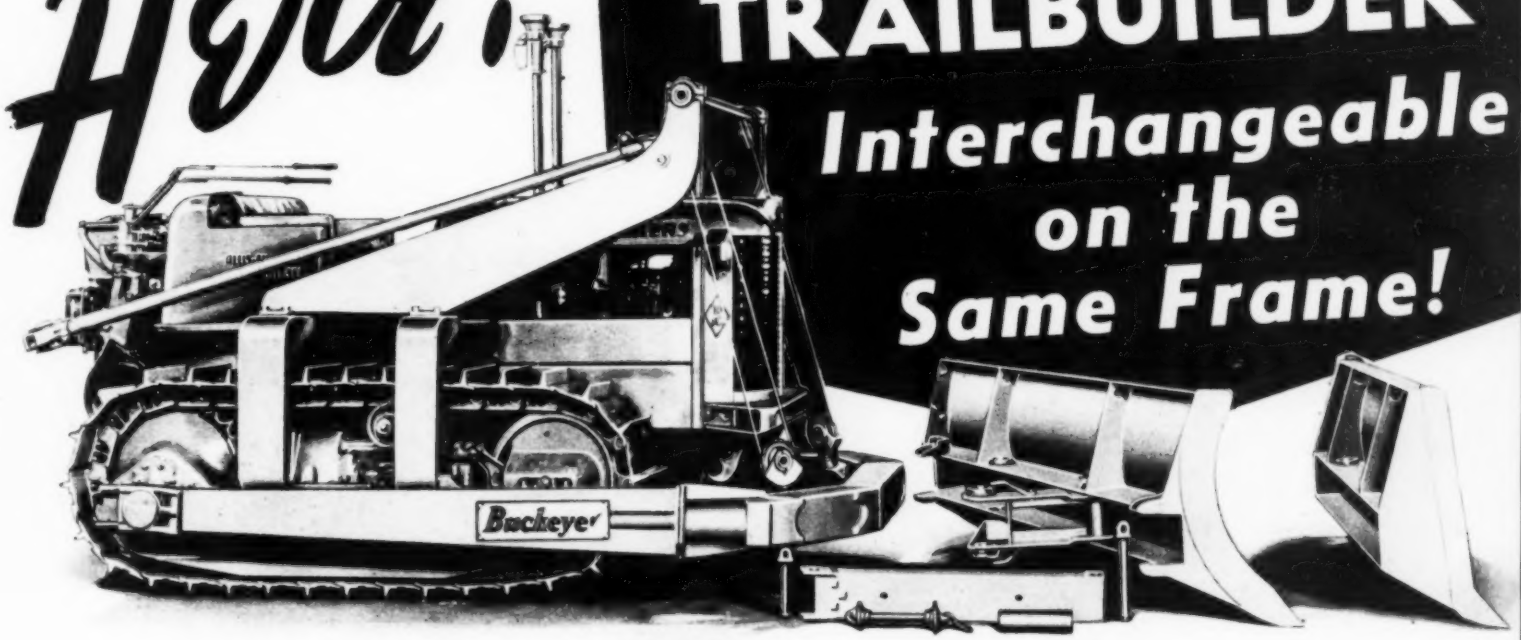
THE TEXAS COMPANY, Asphalt Sales Department, 135 East 42nd Street, New York City

Boston Philadelphia Richmond Jacksonville Chicago Houston

It's Here!

Buckeye UNITILT BULLDOZER and TRAILBUILDER

Interchangeable on the Same Frame!



1. INTERCHANGEABLE BLADES ON UNITILT FRAME — You buy only *one* frame! The Buckeye UNITILT frame is universal for Buckeye Blades! Changing from Bulldozer to Trailbuilder blade or vice-versa is quickly done by one man pulling two kingpins.

2. EASILY TILTED — Tilting of the blade requires the adjustment on the frame of one bolt only to raise or lower at either end! The only interchangeable unit that will tilt a Bulldozer blade!

3. BLADE ROLLS THE DIRT — Rolling action of blade enables operator to take deeper cuts because the load is rolled up ahead and not pushed ahead — no dead weight — less power required — bigger "payloads" — moves faster — less strain on tractor — blade digs its own way in — no cylinder needed for down pressure.

4. BLADES HUG FRONT OF TRACTOR — Bulldozer and Trailbuilder blades hang close to radiator, greatly reducing load and wear on front idlers and track rollers. Note rigid, close-coupled construction.

5. TRAILBUILDER EASILY ANGLED It's a simple operation to install the extension to either side arm to angle the blade either way. A second member is also installed to give greater rigidity.

6. FULL FLOATING BLADE — Side arm pivot at drive end of tractor — free-swinging action up or down for high lift and deep bite of blade. Buckeye cable control gives tremendous power and lightning-fast action!

7. BALANCED TO UTILIZE FULL TRACTOR POWER — Full lengths of crawlers stay on the ground—no lost traction —maximum pushing power assured — mechanical downward pressure not required — no cylinders for pushing blade down and tipping tractor up.

8. CABLE CONTROL — At its best with Buckeye Power Control Units — smooth, fast action with no jerk on the line, greater lifting power, simplicity and freedom from trouble!

9. RUGGED FRAME — Stout sidearms and fully braced front cross beam — a brute for the punishment of the toughest job!

10. CLEAN CUT DESIGN — No overhead frames to obstruct vision — simple, rugged design — no lost motion between members — long-wearing.

COUNT the Buckeye features that spell more yardage per day and bigger profits on any 'dozing job. There's a Buckeye UNITILT frame with Bulldozer and Trailbuilder moldboards for your tractor. Write for literature today. BUCKEYE TRACTION DITCHER CO., Findlay, Ohio.

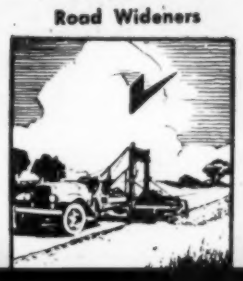
Built by Buckeye

Convertible Shovels

Trenchers

Tractor Equipment

R-B Finegraders


Road Wideners

Spreaders

ROEBLING

"Bridges a Century with Wire"

ROEBLING WIRE ROPE AND STRAND • WIRE ROPE SLINGS AND FITTINGS • SUSPENSION BRIDGES AND CABLES • AERIAL WIRE ROPE SYSTEMS • ELECTRICAL WIRES AND CABLES • HIGH AND LOW CARBON COLD ROLLED STRIP • ROUND AND SHAPED WIRE WIRE CLOTH AND NETTING • STEEL AND COPPER RODS • HIGH AND LOW CARBON ACID AND BASIC OPEN-HEARTH STEELS

100 years ago John A. Roebling founded the company which still bears his name.

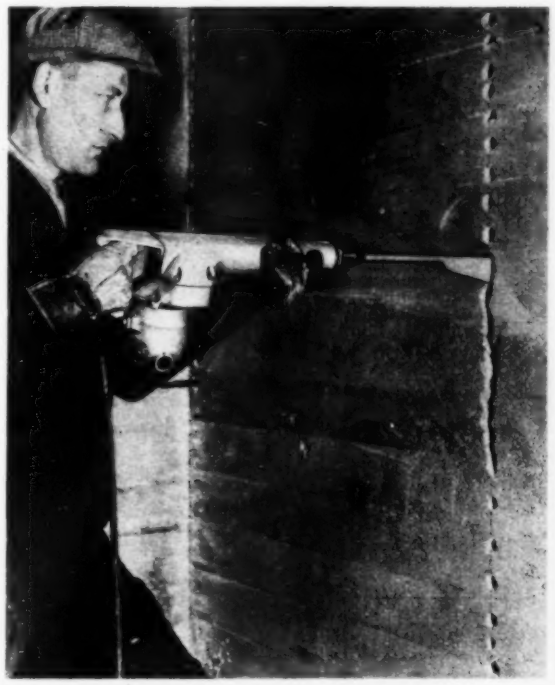
» » Today, after a century of service, the name Roebling is still synonymous with leadership in wire manufacture, improvement and application.

» » In celebrating its 100th Anniversary, Roebling looks forward to the opportunity of serving industry in even greater measure than ever before.

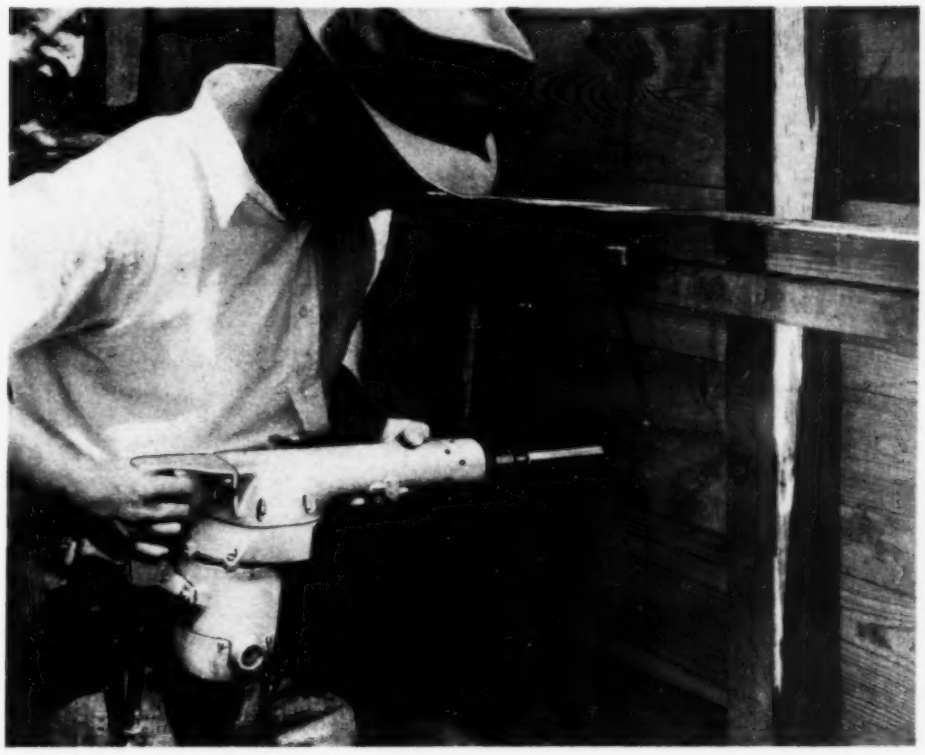
JOHN A. ROEBLING'S SONS COMPANY

TRENTON, NEW JERSEY

FASTER THAN A MACHINE GUN



IN CONCRETE — Black & Decker No. 32 Electric Hammer cutting opening through concrete wall with Web tool. Opening outlined with Star drill holes. These powerful Hammers also drill and channel in concrete, vibrate concrete for a denser mix, remove form marks — perform any hammering operation faster, better and lower cost than hand-pounding.



IN WOOD, METAL AND STONE — Toughest wood timbers are quickly shaped, gouged, cut or notched with B & D Electric Hammers. They also chip and scale metal, remove weld spatter, drill shot hole in rock (as illustrated above) — save time and costs on dozens of every-day hammering jobs on construction projects.

POWERFUL

BLACK & DECKER ELECTRIC HAMMERS KNOCK TIME OFF JOBS!

POUNDING 2500 sledge-hammer blows a minute, Black & Decker Portable Electric Hammers save time and slash costs on every construction operation requiring fast, strong-impact hammer action. Four powerful models, from 3/16" to full 2" capacity, drive star drills, speed bits, chisels, and 15 other Black & Decker Hammer tools. With B & D Electric Hammers you can perform such operations as vibrating poured concrete for a stronger and denser mix (as illustrated above); break through brick walls; drill in stone for "pot-shooting"; scuff concrete and cement surfaces to make them skid-proof, and to prepare these surfaces to take plaster, stucco and other finishes; break through paving for installing manholes for gas or water mains, power or phone cables — and perform a wide variety of other heavy construction operations. Ask your jobber for a demonstration, or write for Free Hammer Handbook. The Black & Decker Mfg. Co., 759 Penna. Ave., Towson, Md.

"ELECTRIC TOOL HEADQUARTERS"

LEADING DISTRIBUTORS EVERYWHERE SELL

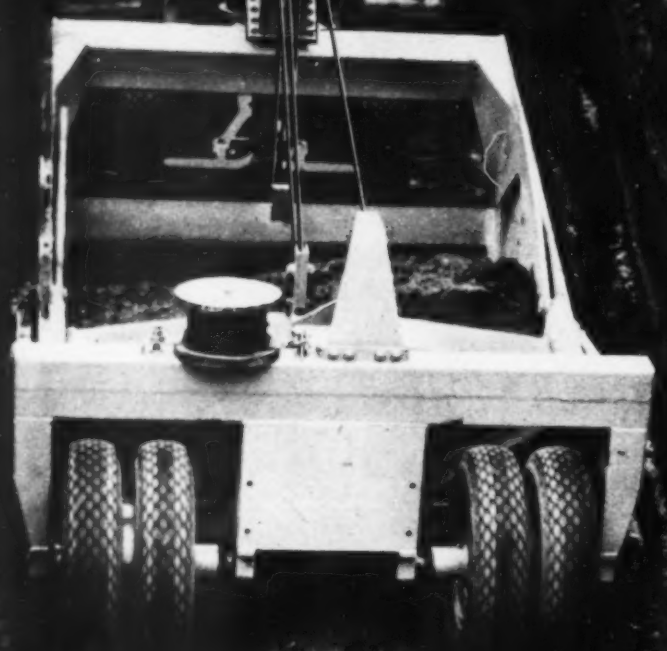
FREE! NEW "HAMMER HANDBOOK"

Latest completely revised edition, illustrates the construction, operation and dozens of practical applications for Black & Decker Electric Hammers and Accessories. Write for your copy now!

Black & Decker

PORTABLE ELECTRIC TOOLS

A NEW WAY TO DIG



TUNNELS AND TRENCHES

BUCYRUS ERIE

Easier, quicker, cheaper . . . back and forth with a 4-Wheel scraper taking the dirt out ramps at the ends and through a cross-cut in the middle . . . working a figure-8 to eliminate dead hauls to the dumps alongside . . . plowing out corners with an angled Bullgrader to keep the walls vertical.

Of course you use Bucyrus-Eries to get the most out of the job! On this rush defense project, the contractors were enthusiastic about the performance of their selection, Bucyrus-Erie S-90 and S-67 scraper and a Bucyrus-Erie Bullgrader.

Short scraper turns in narrow quarters were involved — here Bucyrus-Erie's short turning radius and low center of gravity were important. This tough clay was hard digging — but Bucyrus-Erie's double-curved cutting edge loaded it with ease. Close side-clearance was required to dig in against this vertical bank — and the Bucyrus-Eries were best at that too.

Check these Bucyrus-Erie scrapers for YOUR defense project . . . You'll find they-have-what-it-takes for your job, too! Bucyrus-Erie Company, South Milwaukee, Wisconsin.

See your INTERNATIONAL TRACTRACTOR *distributor*

"With GULF LUBRICANTS and fuels we move more dirt and rock at less cost"

says this contractor

"By following the Gulf engineer's recommendations, our equipment operates at peak efficiency day in and day out... in January as well as in June"

Ralph Myers Construction Company, Salem, Indiana, is relocating 6.79 miles of the William Penn Highway near Pittsburgh, Pennsylvania. Gulf lubricants and fuels help keep this modern earth-moving equipment operating at top speed without unnecessary delays.

"WE started in January on this job and kept ahead of a tough contract schedule right through the cold weather, thanks in large part to the quality lubricants and fuels recommended by the Gulf engineer," says this contractor. "Now in warm weather we continue to operate with maximum efficiency and negligible maintenance costs by following his recommendations."

You, too, will find it *real economy* to use Gulf quality lubricants and fuels on your next contract. Call in a Gulf engineer today and ask him to recommend the right lubricants and fuels for your equipment. His one big aim is to help speed your work. No matter where your job is located, you are sure of quick delivery of Gulf quality products through more than 1200 warehouses located in 30 states from Maine to New Mexico. Write or phone your nearest Gulf office.

GULF INDUSTRIAL LUBRICATION

GULF OIL CORPORATION · GULF REFINING COMPANY · PITTSBURGH, PA.

It's New!
HARD ROCK LUG TIRE
Lug bars up to 50% wider give longer tread life, extra cut and bruise protection
It's New!
SURE-GRIP GRADER TIRE
20% to 50% more traction in mud and snow—by test
It's New!
ALL-WEATHER EARTH MOVER TIRE
An average of 40% more rubber in tread and sidewalls for longer wear, snag and bruise protection

All-Weather—T. M. The Goodyear Tire & Rubber Company

The new

BIG THREE

for all off-the-road work

HERE are the three biggest, toughest, sturdiest tires Goodyear has ever built for off-the-road service—and that's saying a lot. They're completely new in design and construction from bead to tread—improved, strengthened, fortified with the finest materials ever used in truck tires—to give you record-breaking performance.

All three average upwards of 40% more rubber in tread and sidewalls. All three have improved treads that give greater wear and better cut and snag protection in their respective services—treads that won't pack up with dirt or stones. All three are armored with a new high-tensile cord carcass—10% to 12% stronger than ordinary truck tire cord. And all three have new massive beads that armor against chafing and rim-cutting.

They're all BIG tires—built to maximum cross-section—to give you full flotation, slow, evenly distributed wear, and longer trouble-free life.

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

THE GREATEST NAME IN RUBBER

GOODYEAR

Construction Methods

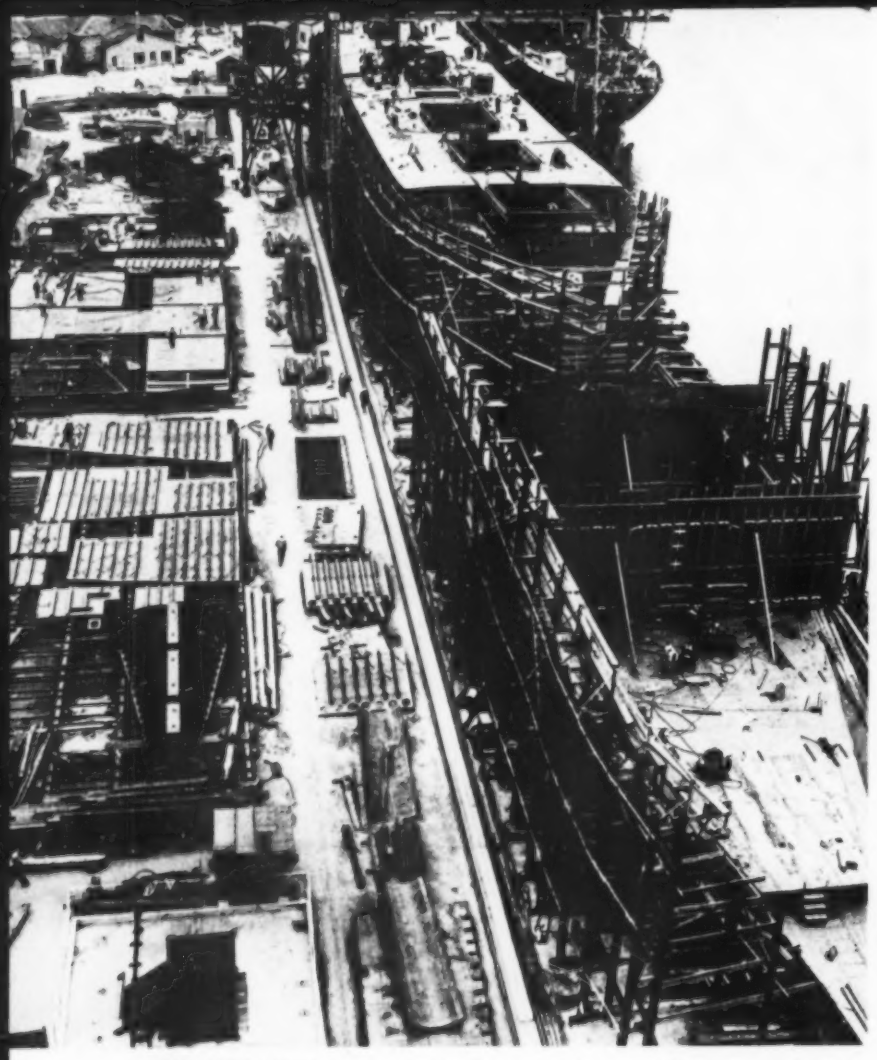
ROBERT K. TOMLIN, Editor

Volume 23 | JULY, 1941 | Number 7

Military Bridges

Of Two Pontoon Types For British Army Use Are Tested by Royal Engineers

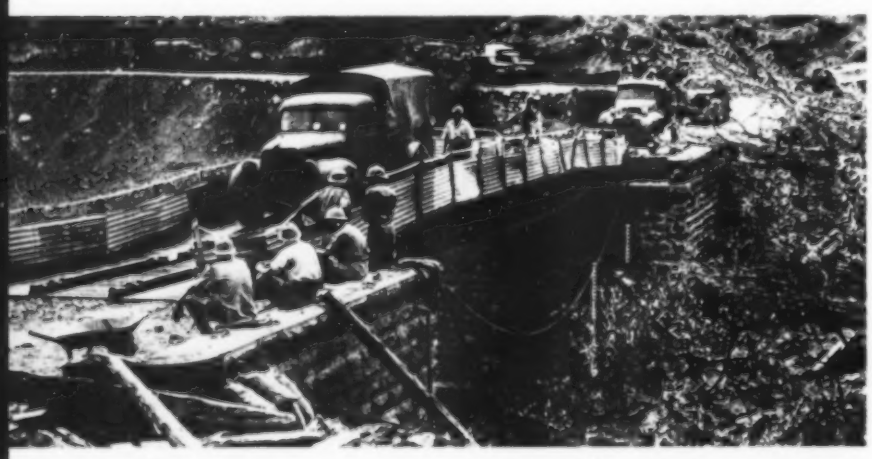
Photos, British Combine



SHIP BUILDING by mass production methods is in full swing at Consolidated Shipyard, Long Beach, Calif. In right foreground half hull of vessel is under construction and behind it is complete hull almost ready for launching.

Wide World Photo

THIS MONTH'S NEWS REEL



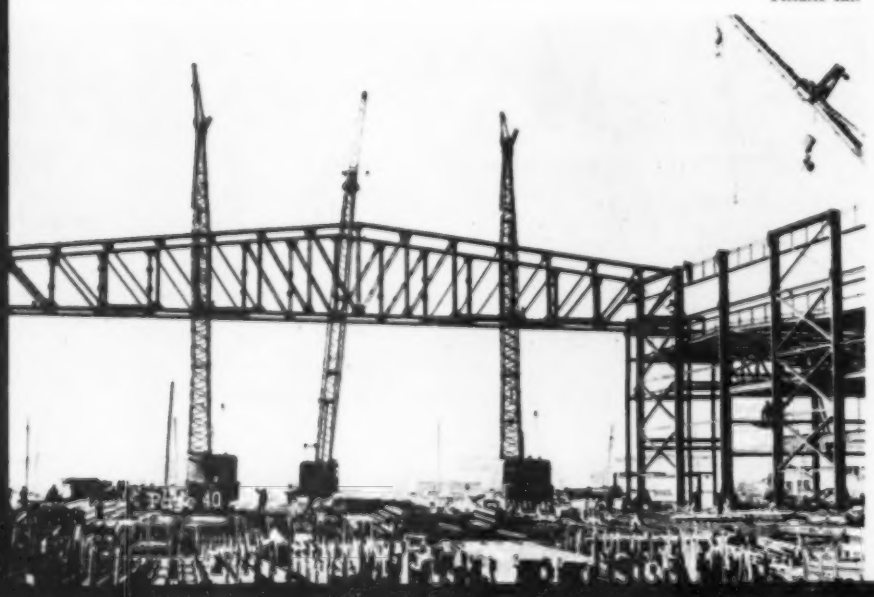
BRITISH ARMY ENGINEERS (left) approaching Addis Ababa, in Abyssinia, replace bridge at Awash which had been blown up by retreating Italian troops.

British Combine Photo

WATTS BAR DAM, (below) Tennessee Valley Authority project, takes form as construction forces rush work on power house in foreground, and on spillway section beyond. Navigation lock is shown across Tennessee River. Dam will be 97 ft. high and 2,965 ft. long. Site is 65 mi. upstream from Chattanooga, Tenn.

AT $25,000,000 NAVAL AIR STATION (below), Quonset Point, R. I., three long-boom cranes raise into position 75 ft. above floor 15-ton truss of 163-ft. span for assembly and repair shop. Construction of big defense project is being done for Navy's Bureau of Yards and Docks under cost-plus-fixed-fee contract by George A. Fuller Co. and Merritt-Chapman & Scott Corp.

Pictures Inc.



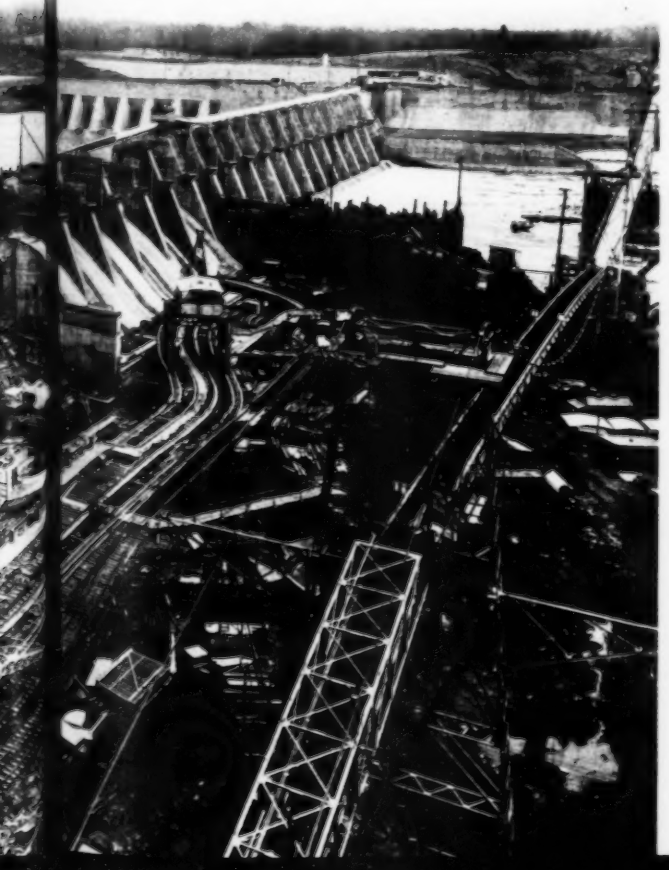
BOMBERS FOR ARMY SERVICE will be produced by Ford Motor Co. at this new plant for which erection of steel framework is under way at Ypsilanti, Mich.

Wide World Photo

PREFABRICATION METHODS are applied to construction of 184 houses forming Audubon Village in New Jersey, a $1,400,000 Federal Works agency project. Panel sections about 8 ft. square are made up in shop with aid of assembly jigs and lumber cut to exact dimensions with six 14-in. power saws. Prefabrication work is done by Day Housing Corp. under subcontract with Wheeler Engineering Co., of New York, general contractor.

BRIDGE DESIGNER HONORED. Bronze monument of late JOSEPH B. STRAUSS, designer of 4,200-ft. suspension span Golden Gate bridge at entrance to San Francisco Bay, is unveiled May 28 by Golden Gate Bridge and Highway District in organization of which he played leading part. Monument bears inscription: "Idealism and Action United to Form the Creative Power of This Achievement."

ON CHICAGO'S NEW SUBWAY (below) open-cut construction of Division-Clark St. station on State St. route is carried on by Kenny Construction Co. under direction of city's Department of Subways and Superhighways.



NAVY SPEEDS

Low-Cost Housing

FITTED TO

LOCAL CONDITIONS

RAPID CONSTRUCTION OF LOW-COST DWELLINGS utilizing modern materials and methods of erection in varied designs has characterized the Navy Department's high-speed program to provide housing for families of married personnel at shore establishments. Within the limits of a designated useful life of at least 25 years and a maximum cost of $3,000 per dwelling unit, including land and outside utilities, local officers representing the Bureau of Yards and Docks have been at liberty to exercise ingenuity in developing plans and prosecuting construction, with Washington headquarters acting principally in an advisory capacity. At a number of locations this free cooperation has resulted in rapid completion of houses possessing high standards of quality at costs well below the established maximum.

Representative examples of the results obtained on projects of 200 dwelling units each, employing contrasting techniques of design and construction, are offered by the low-cost housing erected for families of married personnel at the Opa Locka Naval Air Station, Miami, Fla., the U. S. Naval Air Station, Jacksonville, Fla., and the Navy Yard, Charleston, S. C. Fixed-fee contractors built the houses on the three projects; skilled planning and purchasing, good organization, and capable supervision speeded operations by the contractor at each site.

Opa Locka Houses

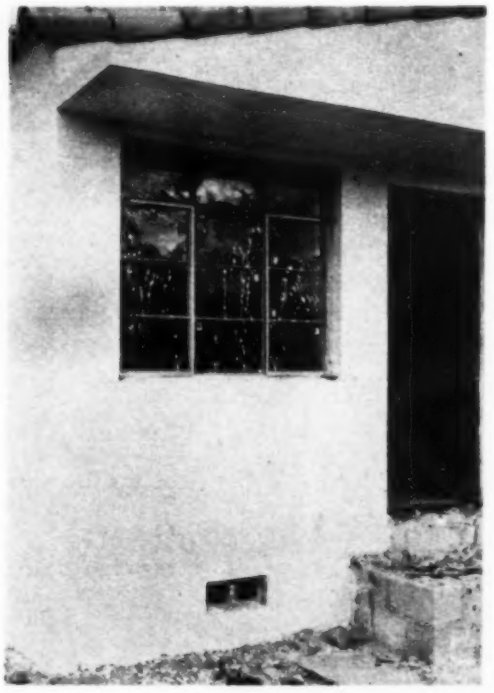
At a construction cost, including utilities but excluding land, of less than $2,400 per unit, The Mackle Co., Miami, Fla., under the direction of Lt. Comdr. E. W. C. Nice (CEC) U.S.N.R., officer in charge, erected individual four-room stuccoed concrete-block houses at a rate which culminated in the roofing of the final house in the 200-unit project on the 46th working day. The contractor employed a maximum of 225 workmen on a single 8-hr. shift. Effective organization and utilization of the productive capacity of this working force, coupled with advantageous buying of materials, fixtures and equipment in quantity lots, enabled the builder to complete houses of superior quality at the low construction cost figure already mentioned.

All the houses employ the same floor plan. By turning the

OPA LOCKA HOUSES

FOUR-ROOM HOUSES having stuccoed concrete-block walls and cement tile roofs employ single floor plan. By turning houses three ways on lots and using both hip and gable roofs, designers obtain six exterior variations which are further accentuated by varied selection of paints and roof tile.

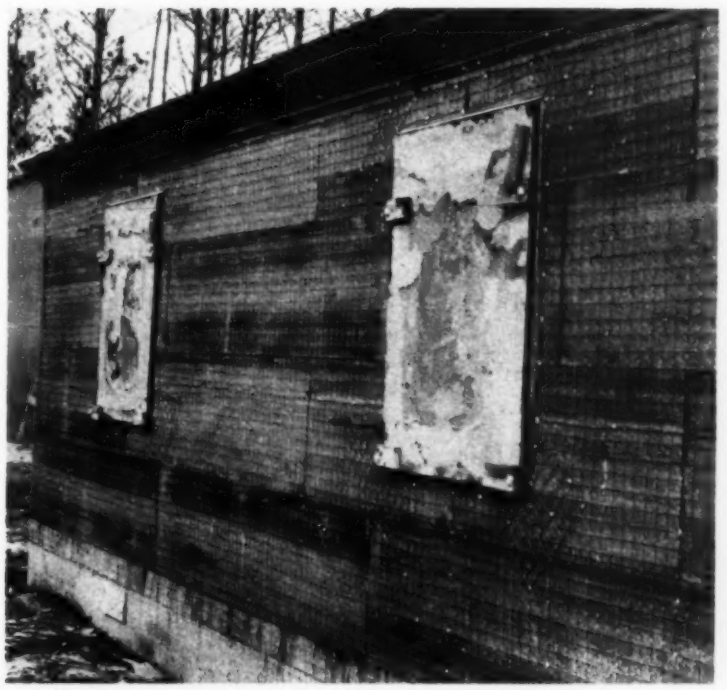
REINFORCING RODS (left) are in place for rake beam on top of end gable. Reinforced-concrete girt beam capping exterior walls of house is dropped over windows to form window heads. Ornamental louver is precast concrete unit.



CANTILVERED CANOPY (above) over entrance door is anchored to girt beam. Vents in foundation walls consist of precast concrete frames fitted with heavy galvanized screens; these units are set in mortar as block walls are laid up. At bottoms of all front and rear doors, plans provide aluminum threshold and hard copper weather stripping.

JACKSONVILLE DWELLINGS

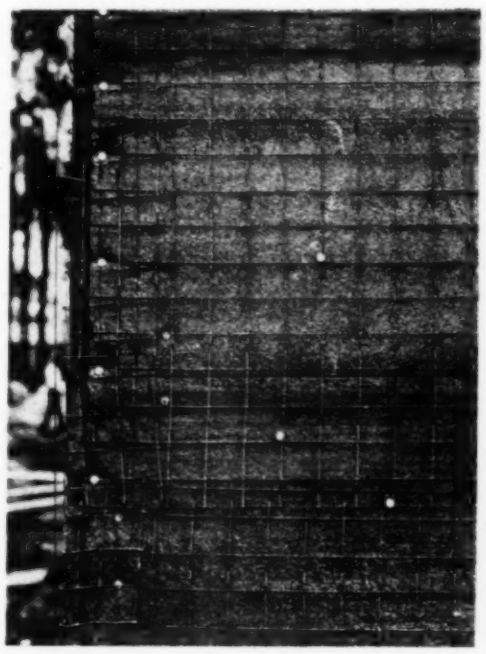
FINAL SPRAY COAT of sand, cement and water containing waterproofing compound is shot against Gunite exterior about ¾ in. thick on walls of low-cost houses at U. S. Naval Air Station, Jacksonville, Fla. This seal coat fills holes left by screws which supported guide wires during initial Gunite application.



WIRE MESH tacked to asphalt-impregnated Celotex sheathing forms reinforced backing for Gunite application. Note double reinforcement of wire mesh at window corners.

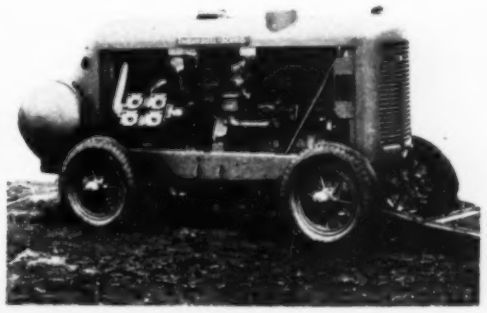
houses three ways on the lots, and by topping them out with two types of roof, hip and gable, a total of six exterior variations was obtained. The variety is enhanced by roofing with two types of cement tile, flat and barrel, each available in four colors, and by painting doors and shutters in varied colors.

Structurally the houses include the following features: 12x20-in. concrete footings; walls of 8-in. concrete block made by a nearby commercial plant using local lime rock aggregate; corner blocks converted into vertical columns by inserting reinforcing rods and slushing in cement mortar as blocks are laid up; reinforced-concrete girt beams and roof rake beams; girt beams anchored into top course of blocks by dowels of concrete worked down into holes in hollow blocks; front entrance canopy of reinforced concrete; precast stone window sills; stuccoed exterior; partition frames and roof trusses assembled at central yard, using jigs and wood-

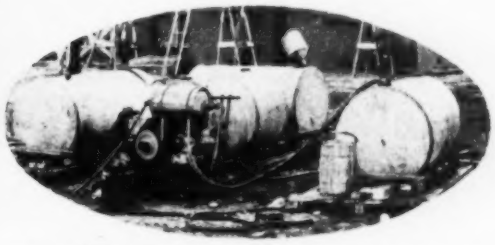


CORNER DETAIL of fiber board sheathing and reinforcing mesh indicates also guide wire stretched over screw driven into corner stud. Asphalt-impregnated face of moisture-resistant sheathing is placed against studs of wall frame.

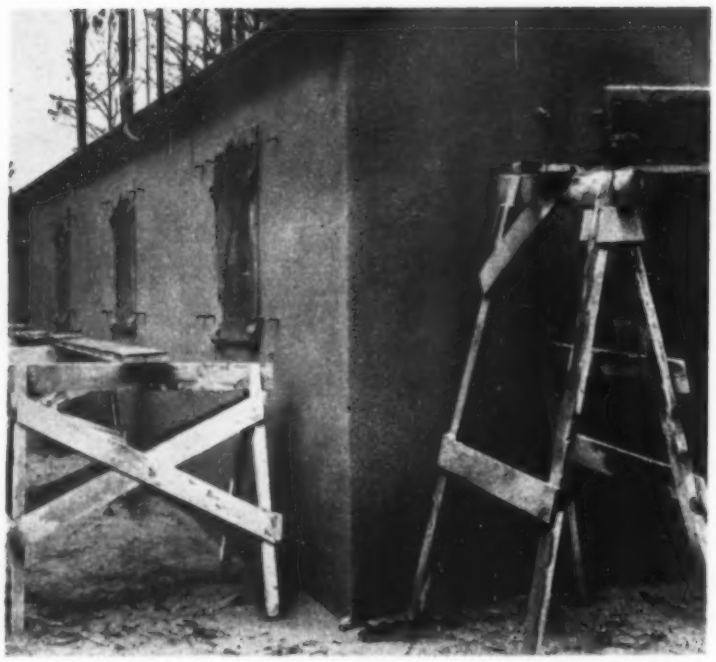
BY ADMITTING COMPRESSED AIR to charge chamber of portable machine, operator blows sand-cement mixture through hose to nozzle, where dry materials combine with water before being blown against wall of house.



PORTABLE COMPRESSOR supplies air for operation of Gunite equipment.



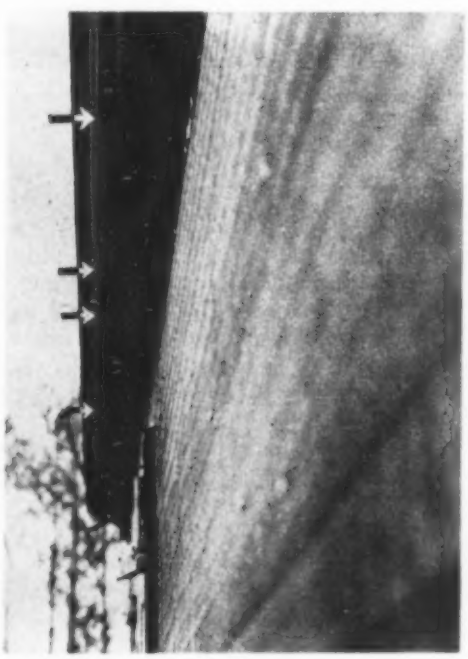
TO AVOID DELAYS in supplying water mixed with liquid waterproofing compound in proportion of 1 qt. of compound to 1 gal. of water, contractors use battery of tanks and switch suction line from one to another.



STRAIGHT LINES and regular surfaces are obtained by using guide wires and special tools for finishing Gunite coat.

working equipment; all lumber in contact with masonry coated with creosote on contact face, this coating being applied at site. Wall plates were secured to the concrete block walls with bolts set into joints of the blocks, and roof rafters were securely spiked to the plates; additional anchorage for the roof was provided by hold-down straps at 4-ft. centers embedded in the girt beams and spiked to the rafters. Roofs were built up on 7/8-in. t. & g. sheathing with a cap sheet of 30-lb. roofing felt tin-tacked on 12-in. centers to the sheathing; 90-lb. slate-surfaced felt roofing was mopped on the cap sheet, and cement tile was set in cement mortar on the slate-surfaced roofing, which provided good bond for the mortar.

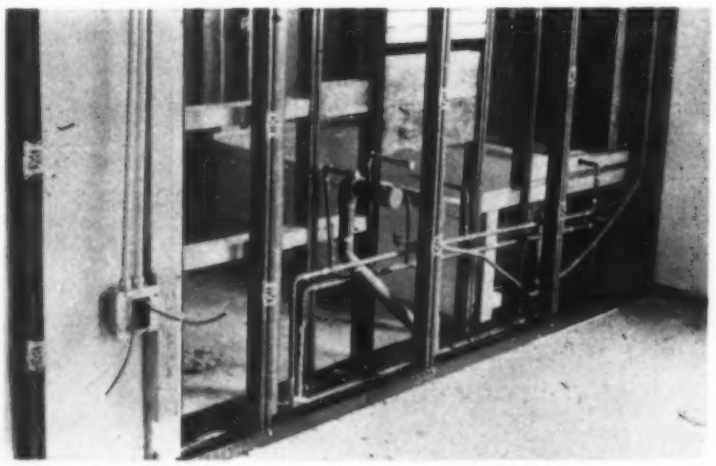
In the interior, the houses have hardwood floors laid over building paper on subflooring, linoleum in kitchen and bath, walls furred and plastered on plaster board with wall coloring contained in textured finish coat. Equipment includes electric range, electric refrigerator and electric water heater. Electrical work is strictly N.E. code in all respects; galvanized steel tubes are used for conduits and are carried overhead to all rooms to avoid traps under the floor; each room has two duplex plug receptacles. Toilet fixtures are strictly modern, with shower over tub; a combination sink and laundry unit is provided in the kitchen. The houses are fitted throughout with brass hardware and copper screens, steel sash, and Venetian blinds running in metal guides. Water pipe is galvanized steel.



DELICATE JOB of molding cove cornice is aided by guide wire stretched under eaves.

SHAPING TROWEL cut to proper curvature trims cove cornice to depth indicated by guide wire. This operation is part of finishing work on first rough coat of Gunite, about 3/4 in. thick, prior to application of spray seal coat.

TO STRIKE OFF Gunite cornice parallel with edge of overhanging roof, workmen use ordinary finishing trowel.



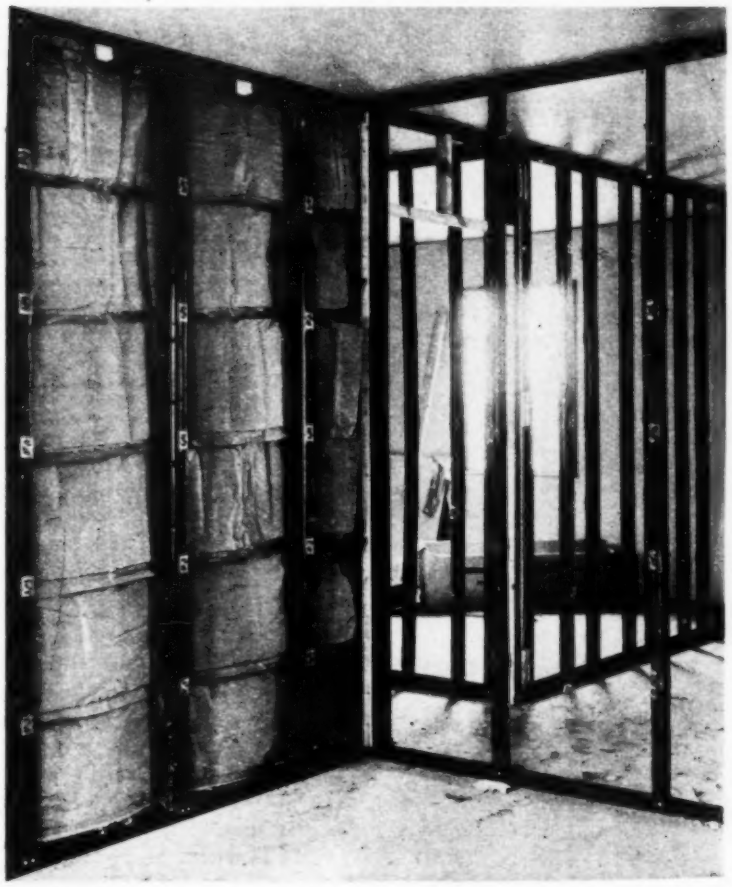
COMPLETE PLUMBING for each house comes in package from Chase Brass Co. Note wiring conduit at left leading down from overhead to double plug wall receptacle. Electrical fixtures for each unit also come in complete package.

For The Mackle Co., fixed-fee contractor, Miami, Fla., Elliott J. Mackle was project manager. Lt. Comdr. E. W. C. Nice was in charge of design and construction for the Navy.

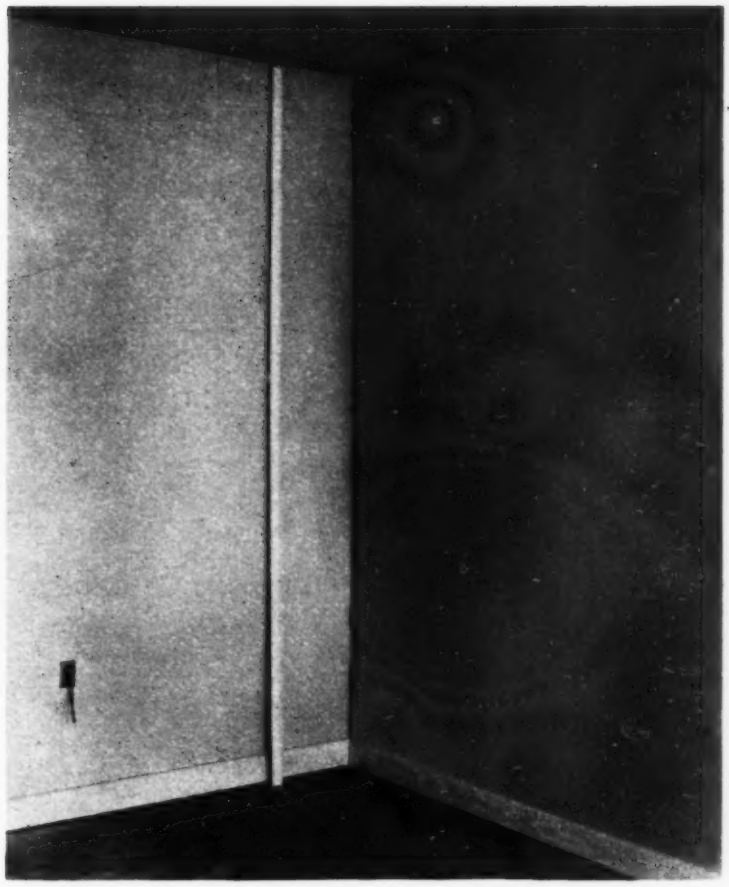
Jacksonville Dwellings

Altogether different in design and construction are 100 one-story double houses erected by Hillyer & Levan, Jacksonville, Fla., for the U. S. Naval Air Station outside that city. Comprising prefabricated, cold-formed, copper-bearing steel framing, asphalt-impregnated fiber board sheathing, exterior facing of Gunite air-shot concrete and interior wallboard cut to full room size, these houses were erected and equipped at a construction cost (exclusive of land and outside utilities) of about $2,600 per dwelling unit. After first completing concrete pan floors on bar truss joists, the contractors erected the steel framing for 72 buildings in 6 days. With all operations in progress on framing, sheathing, roofing, Gunite, plumbing, electrical work, wall board, interior

(Continued on page 105)



FRAMING for walls and partitions employs prefabricated steel studs with nailing feature. Partitions between two living units in each house are formed with double lines of studs and are insulated with rock wool blanket.



IN APPLYING Upson 3/8-in. wallboard (cut to full room size) to interior walls, builders take care not to butt joints but to leave space for expansion under corner and ceiling molds. Ceilings are covered with same type of wallboard in full-length sheets 8 ft. wide, requiring one joint mold across ceiling in each room. Wallboard is given first coat of paint before joints are covered.

CHARLESTON PROJECT

ATTRACTIVE LAYOUT of streets and two-story, six-family houses characterizes project in 23-acre pine wood plot near Charleston, S. C. Navy Yard.

ROOF SHINGLES of asbestos cement are laid over roll roofing on wood sheathing. Fuel tanks for oil heaters are mounted outside back doors of living units.

ASBESTOS-CEMENT SIDING covers asphalt-impregnated fiberboard sheathing on exterior walls. Six-family house has two three-room units in one-story wing; central two-story portion of building contains two four-room and one five-room unit, in addition to third three-room apartment, this last unit being entirely on first floor.

Rainbow Bridge

Has 950-Ft. Steel Arch Erected Without Falsework

ARCH RIBS of 950-ft. span are held in place during erection by cables from 130-ft. temporary steel towers on abutments. Stiff-leg derricks place steel members.

COMPLETION OF THE RAINBOW BRIDGE across the Niagara River and gorge this fall will open to traffic between the United States and Canada the world's longest fixed-end steel arch, with a span of 950 ft. Costing $3,760,000, the bridge has a total length of 1,450 ft. and a deck width of 60 ft. It carries two 22-ft. roadways, separated by a 4-ft. center strip, and a 10-ft. sidewalk. The new structure replaces the famous Falls View or "Honeymoon" bridge which was destroyed by an ice jam in January, 1938.

Ground was broken for the project May 16, 1940 at a site close to that formerly occupied by the Falls View Bridge. At this point, about 1,000 ft. down-stream from the American Falls, the gorge is about 200 ft. deep and 1,000 ft. wide. The great 950-ft. steel arch rises from abutments on the American and Canadian sides of the river to the level of the top of the gorge.

Because of the depth, turbulence and velocity of the water at this point the

(Continued on page 48)

CLOSURE OF 950-FT. STEEL ARCH (below) across gorge of Niagara River is marked by ceremonial exchange of flags by workers from American and Canadian sides of structure.

Wide World Photo

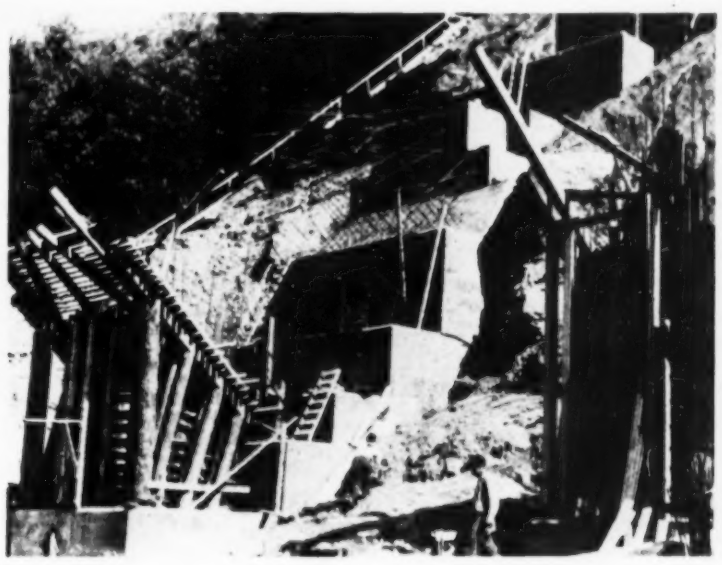
APPROACH SPANS are carried by concrete arches built with aid of timber falsework to carry forms.

Photos, Herb Foster

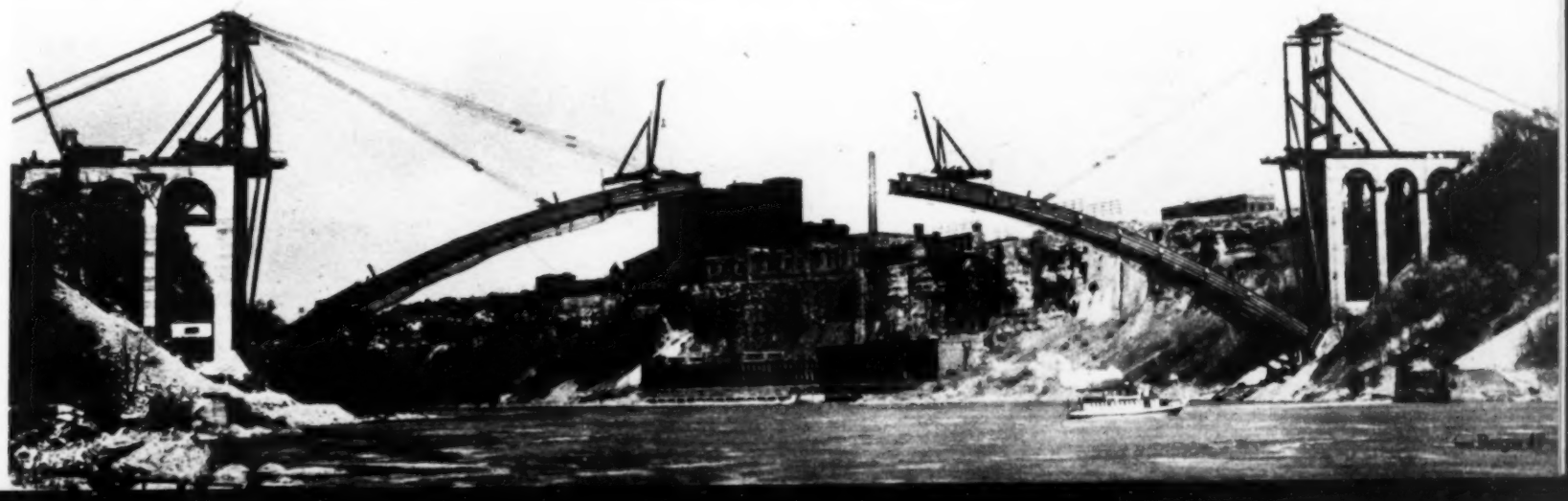
RIVETING CREW ON ARCH are protected by hard hats to prevent head injuries by falling objects.

ELIMINATION OF FALSEWORK (below) for erection of superstructure was necessary because of depth and velocity of river in gorge. Cables from towers on each abutment support arch sections pending closure of two halves at center.

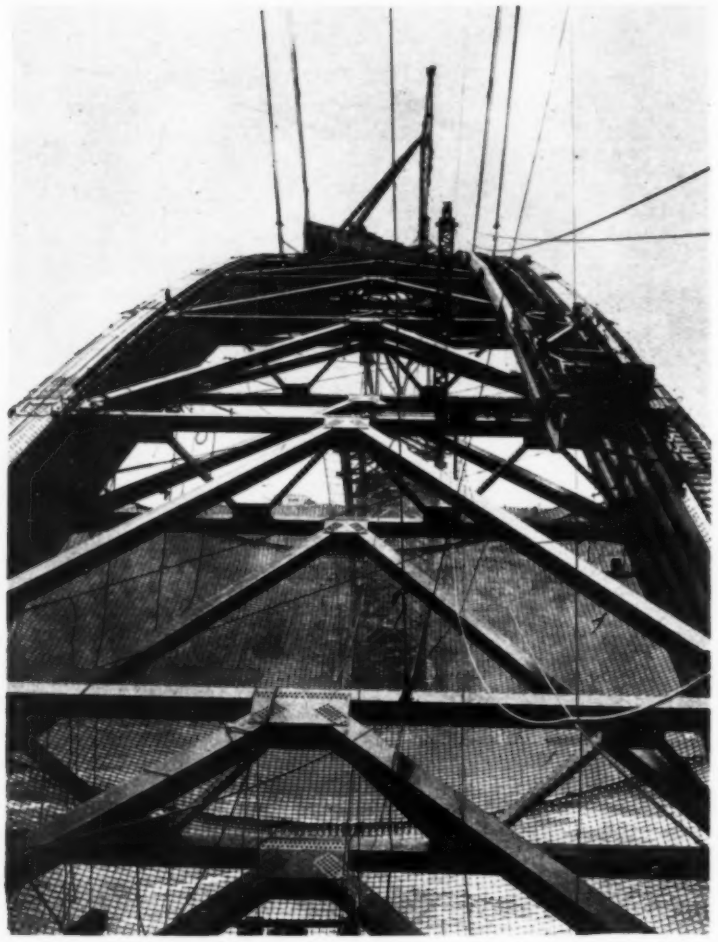
FIFTY-TON SECTION OF ARCH RIB is swung into place by stiff-leg derrick, as workers are protected by safety net stretched underneath steelwork.



FOR SKEWBACKS on U. S. side of gorge reinforced concrete footings are built to support ends of steel arch span.



SAFETY NET stretched underneath steel being erected insures riveter against fatal falls from lofty structure. Girder for arch rib has depth of 12 ft



BRACING BETWEEN ARCH RIBS is by lattice girders riveted to gusset plates. Main arch ribs are spaced 56 ft. apart.

erection of any kind of supporting piers or falsework in the stream was considered either impossible or economically impractical. At this point the river, forced by the Falls through the narrow gorge, flows at from 25 to 30 m. p. h. and is more than 175 ft. deep. Because construction had to be carried on when the gorge was choked with ice, the bridge designers devised other means of supporting the arch until it was completed.

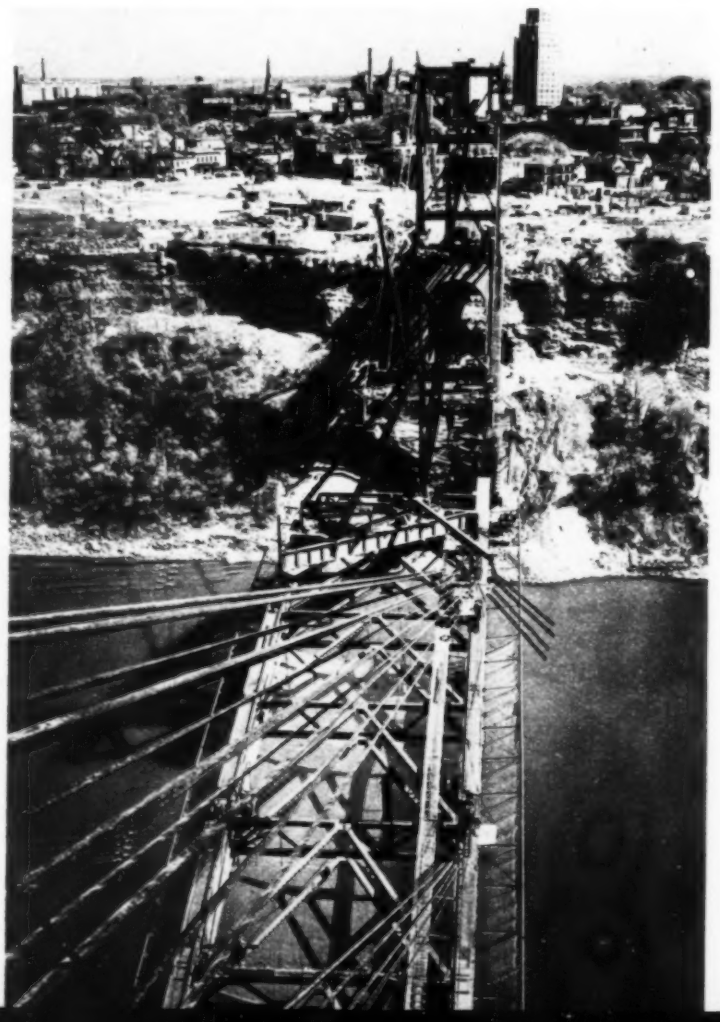
Each of the main arch abutment piers, on both the Canadian and American shores, is located about 50 ft. back from the water's edge and an equal distance above the surface of the water. The piers and the approach spans rest on solid rock which forms the sides of the Niagara gorge, so that they do not have contact with the river and are high above any possible water or ice pack level. This places the bridge beyond reach of the forces of nature which destroyed its predecessor, the Falls View Bridge.

The main fixed-end arch span consists of two steel box girder ribs spaced 56 ft. apart. Each arch section is made up of 24 girders 12 ft. high weighing from 49 to 75 tons. About 3,500 tons of steel are used in both ribs of the arch and 2,000 additional tons in superstructure and decking. The two ribs are braced with steel members for rigidity and to resist forces produced by wind pressure or live loads on the structure. Steel spandrel columns, resting on the arch ribs carry the steel floor girders and concrete deck of the roadway above.

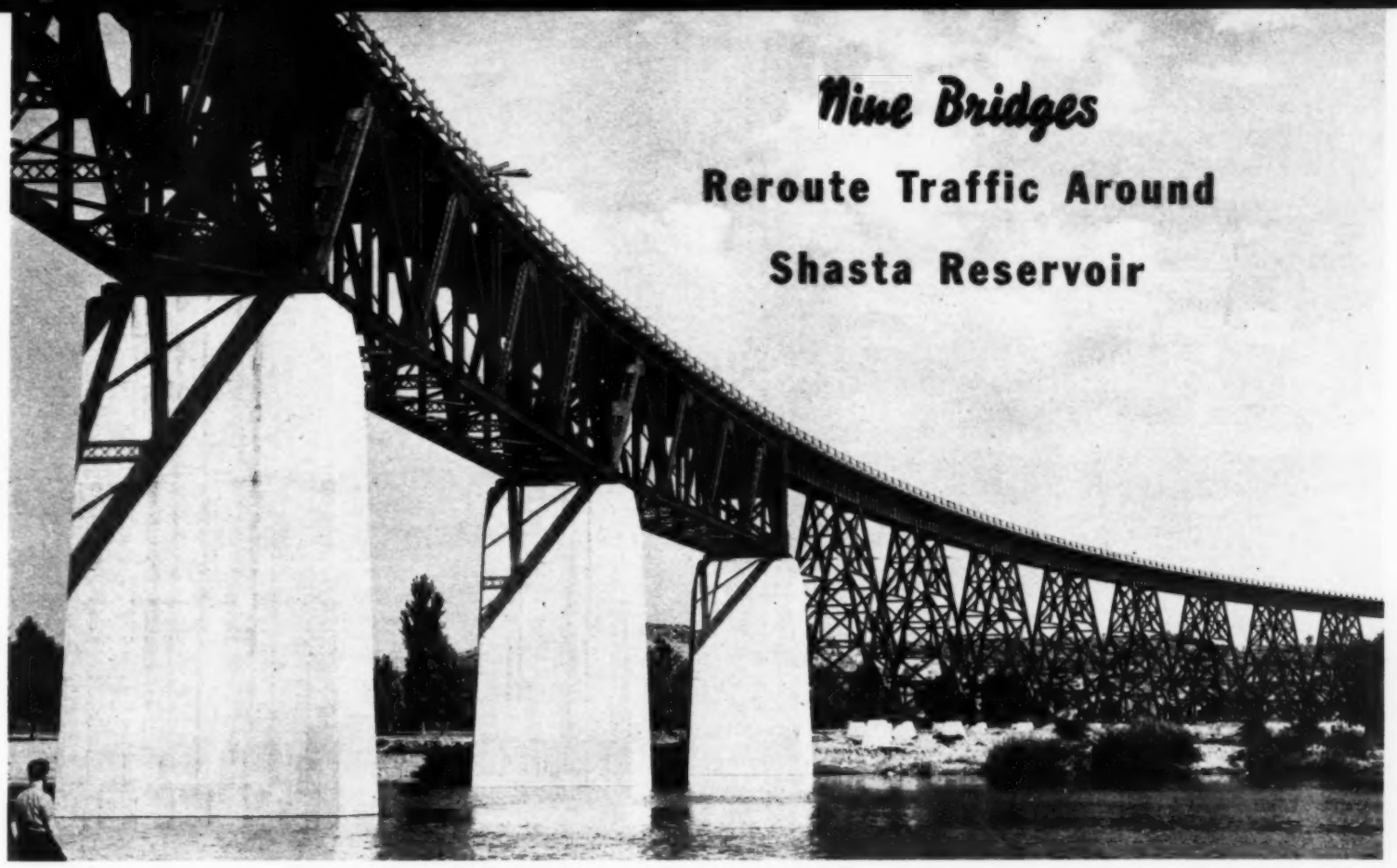
With the use of supporting substructure eliminated as impractical, the Bethlehem Steel Co., contractor for the steel superstructure, used the following method for setting the big

(Continued on page 93)

SYSTEM OF WIRE ROPE CABLES (below) from steel towers at each end of span supports sections of arch during erection, without resort to falsework or piers in swift-flowing river.



Nine Bridges Reroute Traffic Around Shasta Reservoir



U. S. Bureau of Reclamation Photos

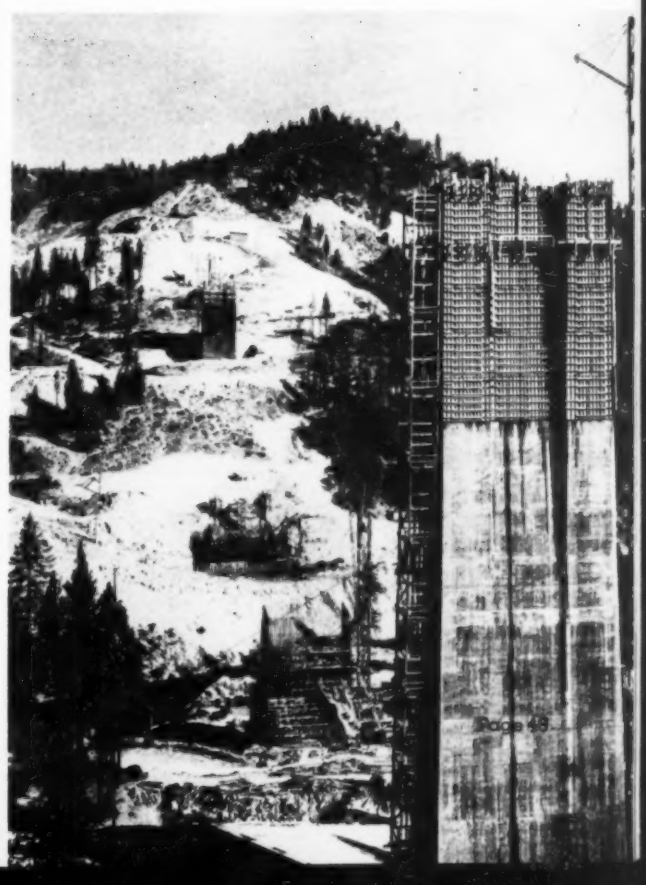
LONGEST OF NINE BRIDGES is 4,347-ft. curved structure forming first crossing of Sacramento River in 30-mi. relocation of Southern Pacific Railroad, starting at Redding, Calif.

CONCRETE AND STEEL form nine new bridges for the railroad and highway relocations being built around the site of the Shasta reservoir in Northern California as part of the U. S. Bureau of Reclamation's Central Valley project. Several of the bridges, of which six are completed at this writing, are pictured herewith in various stages of construction.

FOURTH CROSSING of Sacramento River terminates at portal of one of 12 railroad tunnels involved in relocation project.

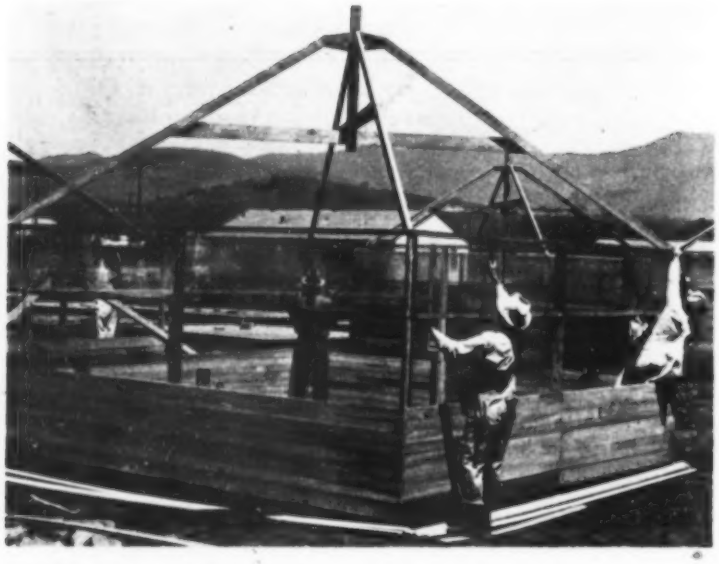
STEEL ARCH SPANS for four-lane Antler highway bridge, 200 ft. high and 133 ft. long will cross upper Sacramento River arm of reservoir.

TALL CONCRETE PIERS (right) support Pit River bridge world's highest double-deck span, which will carry two railroad tracks and four-lane highway. Bridge will be 500 ft. high and 3,588 ft. long.



TENT FRAMES (above and below) to support canvas covers are built over wood floors on redwood sills. Walls have wood wainscoting surmounted by galvanized screen panels.

Wood-Frame Tent Camp BUILT TO SHELTER 20,000 MEN

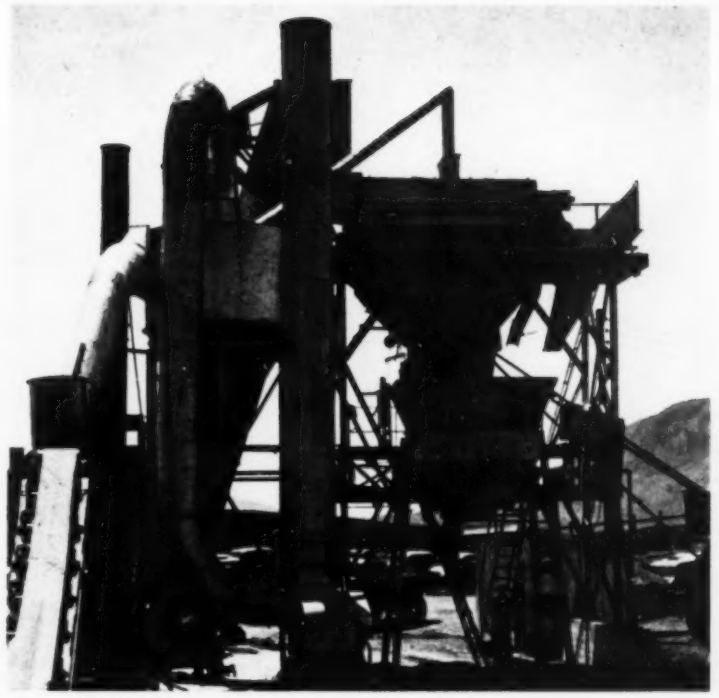


ABOVE WOOD WAINSCOTING around tent floor panels of galvanized screening are being nailed to posts of simple wood frame.

WATER PIPE LINE is laid within camp area by Caterpillar tractor equipped with job-made trussed boom on front end of machine.

PORTABLE GENERATOR powered by LeRoi gas engine operates portable electric saws by day and serves floodlights for night work. There are 70 or 80 of these units on camp job.

CAMP SAN LUIS OBISPO in Southern California consists of 4,700 canvas covered tent frames, each housing 5 men, in addition to 528 larger buildings of other types.



ASPHALT PLANT has capacity of 100—130 tons per hour. Madsen installation for supplying paving material combines four grades of aggregate with E-grade asphalt delivered to trucks at 300—325 deg. F.

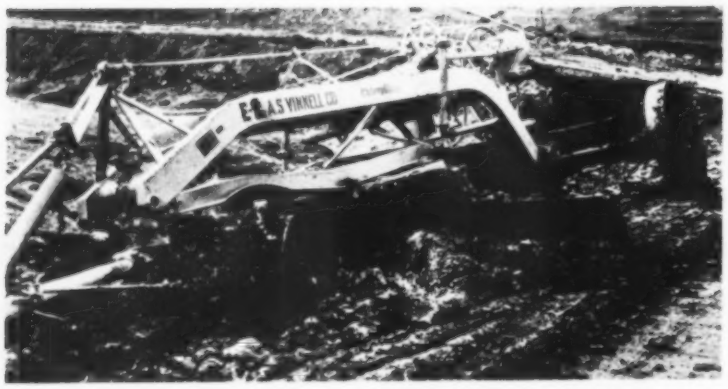
A $16,300,000 PERMANENT "TENT CAMP" to accommodate 20,000 men has been constructed just north of San Luis Obispo in Southern California where the climate makes tent housing, rather than more durable types of two-story wood barracks with solid walls and roofs, adequate for Army needs. The tent units, each designed to shelter five men, consist of timber frames carrying canvas covers, wood floors supported by redwood sills and wood wainscoting surmounted by horizontal bands of galvanized screening. Each tent is equipped with electric light and fuel-oil burner. While the canvas-covered tent frames, of which there are 4,700, provide for the bulk of the required troop shelter, the project called also for 153 mess halls, 31 warehouses, 13 ammunition storage "igloos," 14 detached officers' quarters, 10 recreation buildings, 166 lavatories, 59 hospital buildings and 25 headquarters buildings. The total number of buildings, other than tents, at Camp San Luis Obispo is 528. A 160-acre airport and a 120x160-ft. hangar also are included in the project. As the camp is for motorized troops exclusively, vehicular equipment is provided for by 13 parking areas and 14 gasoline filling stations.

As a preliminary to building housing facilities, it was necessary for the contractor, the L. E. Dixon Co., of Los Angeles, to grade the site by moving 3,000,000 cu.yd. of earth. For this

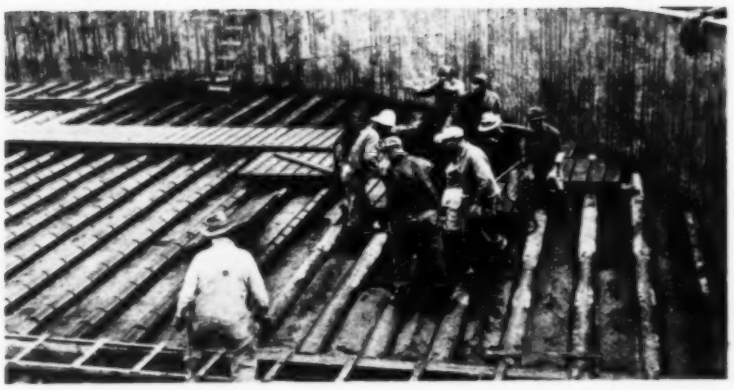
WELDED STANDPIPE fed by water main is self-supporting 4-in. riser equipped with globe valve for filling tank trucks. Braces are welded pipe.

FOR THE CONTRACTOR. L. E. Dixon Co., of Los Angeles, L. E. DIXON (right) confers with his project manager, W. N. EVANS.

TRAVELING SCAFFOLD on skid mounting hauled by tractor is used by electricians installing wires for lighting 5-man tents.



SIDE-HITCHED BLADER was effective under muddy conditions created during 3½ months of rain.



AMONG CONSTRUCTION ITEMS included in contract for camp was trickling filter for sewage treatment.

MUD AND RAIN failed to halt rush work on foundations and superstructures of camp buildings

GUMMED-UP EQUIPMENT, after operating in wet adobe soil, had to be washed down with fire hose.

SIDE BOOM RIGGED on tractor, **(below)** proves useful in laying pipe for water supply.

work and other field operations there was assembled $2,000,000 worth of heavy construction equipment, of which a partial, but typical, list is appended.

Grading the camp site, begun in the winter of 1940, was made difficult by an exceptionally rainy season of 3½ months, during which the saturated adobe soil proved hard to handle. Moving through deep mud the tractors hauled materials on 7x10-ft. timber sleds. Workmen placing concrete footings for buildings had to operate from duckboards. On this work the contractor used 800 units of equipment, including more than 100 tractors, 36 carrying scrapers of capacities up to 35 cu.yd. and 76 dump-trucks of which 22 had 25-cu.yd. bodies.

For the tent frames, mess halls, hospitals and other types of building and general construction, the contractor used 26,000,000 b.ft. of lumber, of which 18,500,000 b.ft. went into tent frames and buildings, the remainder being accounted for by railroad trestles and bridges on camp roads. During the employment peak the payroll carried 6,700 men, of whom 1,600 were carpenters.

For the tent floors and frames lumber was largely precut, but for other buildings most of the cutting was done at the site. The tent frames were supported by redwood sills which it was possible to set in place despite bad weather.

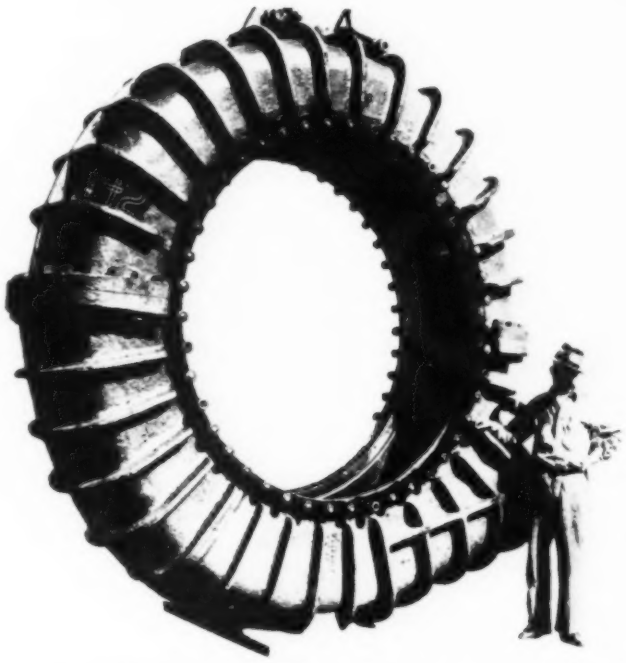
Wet weather delayed paving opera-

(Continued on page 92)

PARTIAL LIST OF EQUIPMENT USED AT CAMP SAN LUIS OBISPO

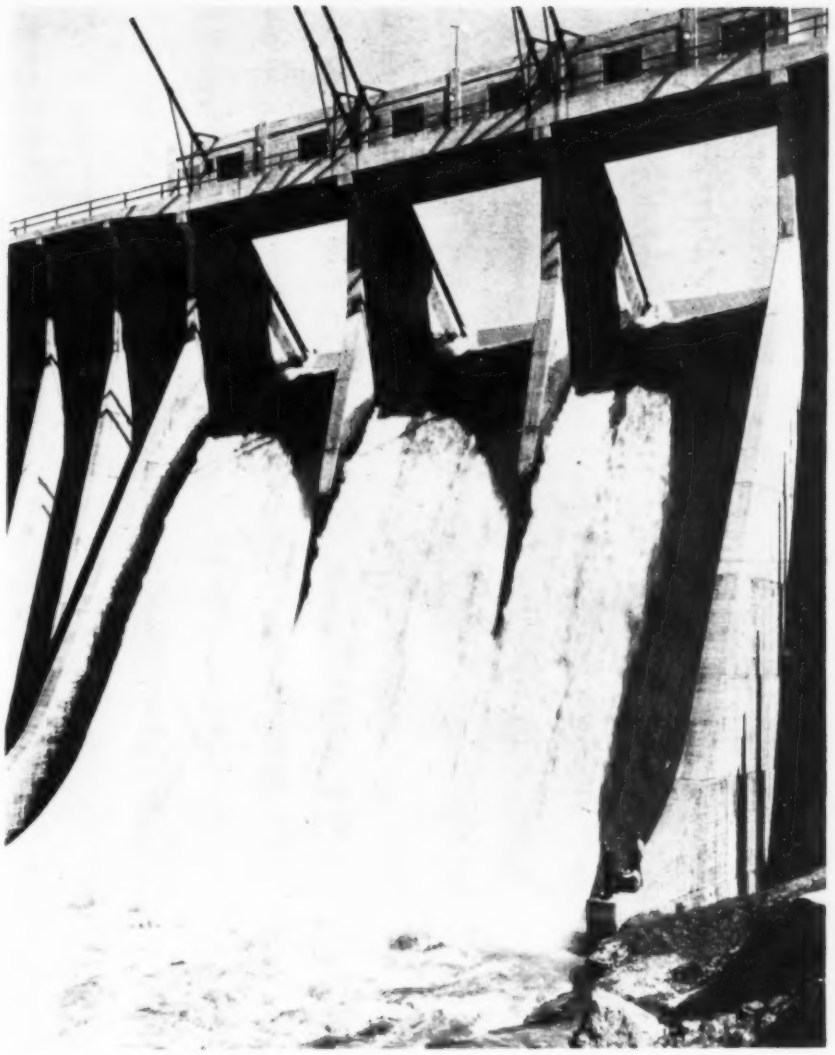
TYPE	Number
Tractors (chiefly RD8's)	104
Trenchers	9
Crawler cranes	4
Power rollers	6
Pile drivers	5
Truck cranes	4
Carrying scrapers (up to 35-cu.yd.)	36
Grease trucks	6
Lumber carriers	5
Air compressors	12
Motor trucks (up to 25-cu.yd.)	265
Portable lighting plants	33
Power shovels	5

JOB oddities



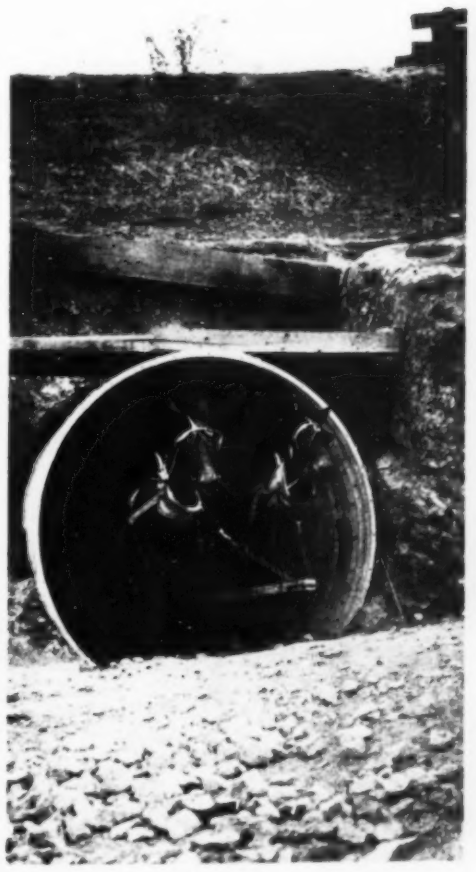
GIANT CENTRIFUGAL PUMP CASE from dredge which placed hydraulic fill in Fort Peck dam, U. S. Engineer Department project on Missouri River in Montana, weighs 24 tons and has 28-in.-diameter suction and discharge openings. Wear caused by abrasion of material pumped is overcome by building up walls of casing to required thickness by electric welding.

Photo, Hobart Bros.



MINIATURE PREVIEW of spectacle to be provided in few years by Shasta and Friant dams in California, is afforded by 100-ft. drop of water cascading down overflow spillway at Stony Gorge dam on Orland project. Using similar overflow spillways, waterfalls at U. S. Bureau of Reclamation's Shasta and Friant dams will be about five times and three times, respectively, as high as drop at Stony Gorge.

"PLAY-ACTING" WAR SCENES (below) with Bob Hope and Dorothy Lamour in motion picture "Caught in the Draft," this Marmon-Herrington rubber-shod track-laying tractor is converted into "tank" by Paramount's property men.



AMPLE HEADROOM is provided for team of mules and wagon by this 10-ft.-diameter Armco multi-plate culvert installed at Italy, Tex., to pass flood waters under railroad embankment.

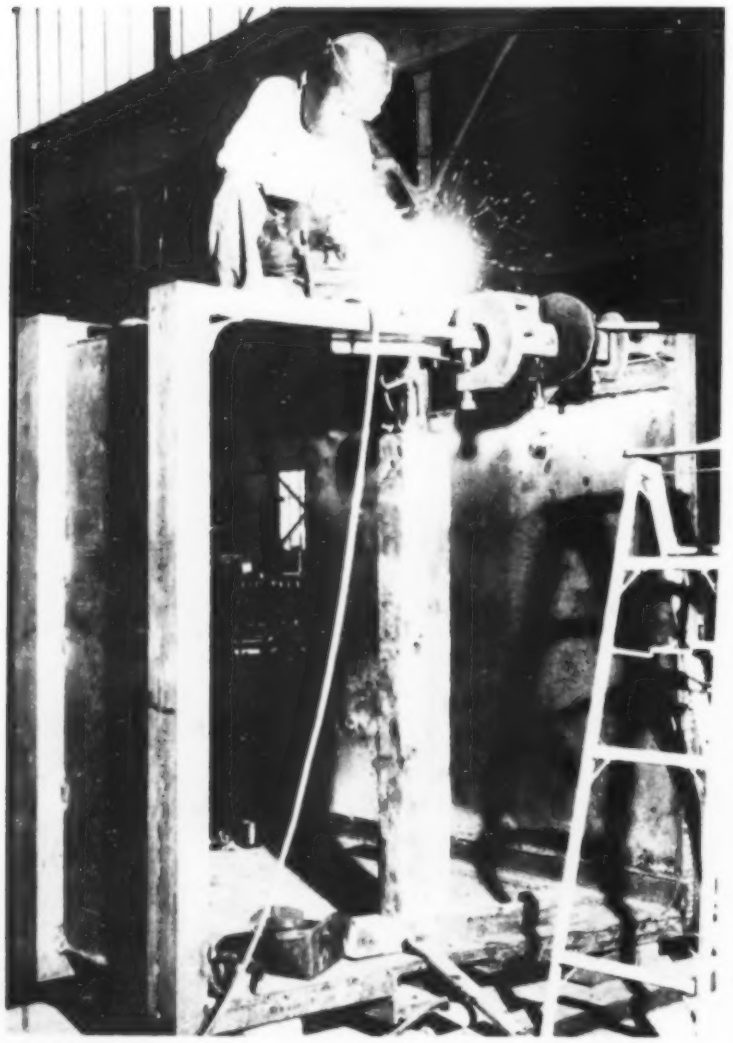
Welding

Plays Big Part in Making and Maintaining Equipment at Shasta Dam

TWO WELDERS perform emergency repair work on big dragline bucket at Shasta dam

AT SHASTA DAM, U. S. Reclamation Bureau project in California, under construction by Pacific Constructors, Inc., welding and cutting tools are used extensively for building new equipment as well as for maintenance and repair of equipment in daily use. In the two years of work that have preceded actual placing of concrete in the dam, the contractors' field welding shop built concrete buckets, concrete hopper cars, concrete hoppers, chutes, gates, bridges, conveyor trusses, shop buildings, and overhead cranes. Welding manipulators for shovel pads, grousers and tumbler sprockets were devised and are utilized to facilitate the buildup and surfacing of parts. Welding is done with both electrical and oxyacetylene equipment and oxyacetylene is extensively used in cutting.

When contractor's equipment for this job was being assembled, it was believed that economies not possible with other means of assembly could be effected with cutting and welding tools, the more so because of the remote location of the project, and hence an effort was made to provide all neces-



ELECTRIC WELDING [illegible] 8-cu.yd. controlled-discharge cableway buckets for delivery of mass concrete

GROUT MIXER DRUMS are fabricated by welding in shops of Pacific Constructors, Inc. Each drum has mixing capacity of 18 cu ft

sary apparatus and to bring shop methods abreast of the latest and best welding practice. In short, on this job dependence was placed on ample welding equipment and capable welders to produce whatever mechanical aids were wanted, "tailor-made" to fit the needs of the job and with a minimum of delay.

In the welding shop and in portable form for use about the job there are twelve welding outfits. These include four 400-amp. and two 300-amp. Lincoln machines as well as two P&H-Hansen 300-amp. machines mounted on rubber-tired chassis and powered with Waukesha gas engines.

To facilitate gas welding and cutting in all parts of the shop, 20 oxygen and acetylene hose connection stations have been provided at points convenient to all working areas of the shop. An oxygen manifold for 10 bottles supplies oxygen gas to this system. Acetylene is generated as required by a No. 3 Oxweld acetylene generator.

About 25 welders regularly work on the shop force which is on duty three shifts daily. Several other departments have their own welders; for example, two are assigned to the garage, while the field mechanical, electrical and rigging forces include welders in their crews when welding is required.

The extent and variety of work accomplished by these welders is indicated by the quantity of welding rods used in the two years of work prior to the first concrete pouring. These quantities, as estimated by the contractor's staff, are: General purpose rods, 68,000 lb.; stainless steel rods, 1,000 lb.; surface abrasion resistant rods, 12,000 lb.; bronze rods, 2,000 lb.; cast-iron rods, 800 lb.; total 83,800 lb.

Machine parts subject to abrasion and impact in excavation service are frequently built up with CM-6 to the normal profile and covered with Haschrome or other similar hard facing to produce a ⅛- to ¼-in. wearing surface. Structural welds are made with Fleetweld, Wilson 98-V&O, or similar rods. Drill steel sharpening dollies are built up and faced with Stellite, Toolweld or Stoodyrod.

CONICAL BUCKET of 8-cu yd capacity is assembled by welding in inverted position. Special formed plates were made in an outside shop. Bucket is used to deliver concrete in small quantities at placement areas restricted by reinforcing steel or narrow forms.

Welding Facilities EFFECTIVE AT FRIANT DAM

WELDING IS ESSENTIAL to effective maintenance of general construction equipment, in the opinion of Griffith Co. and Bent Co., contractors on Friant Dam, in California, and when this job was equipped, provision was made for highly effective welding service by (1) a portable or emergency welding outfit specially assembled on a motor truck, (2) a well-equipped welding plant for handling such work as may be brought in to the job's shop area and (3) several semi-portable outfits that may be stationed where needed. The portable outfit is on a 2½-ton International truck which operates three shifts daily and is always on call for emergencies. Six men are assigned to this truck to provide a 2-man crew through the three shifts. Its equipment includes a Ford V-8 motor directly connected to a 300-amp. generator and an oxy-acetylene welding outfit served by three bottles of oxygen, and an acetylene gas generator (charged with carbide every other morning). The gas hoses are 200 ft. long.

The truck carries numerous small items that are frequently in demand, for example, three kinds of spare teeth for power

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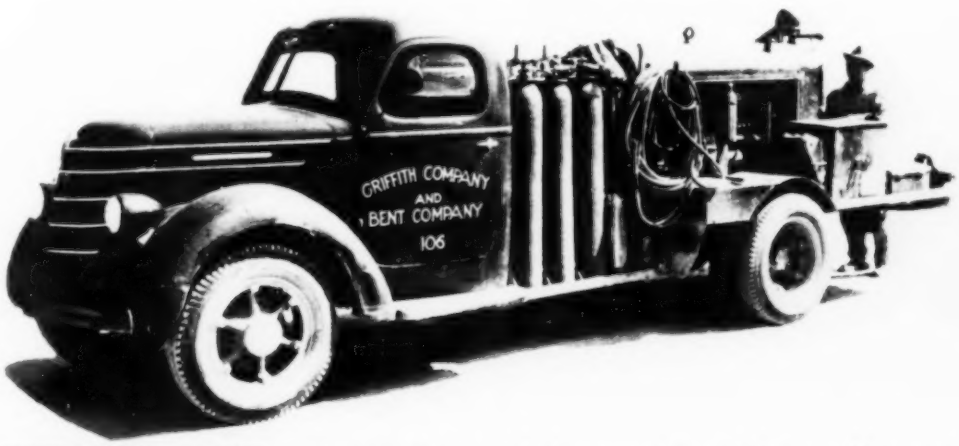


MOBILE WELDING OUTFIT comprises truck carrying both oxyacetylene and electric welding equipment, in addition to nine different welding rods and small parts for emergency repairs.

TWENTY OXYGEN TANKS are connected to manifold that supplies 2,200 cu ft of oxygen consumed per day in welding shop.

WHEREVER THERE'S

YOU'LL FIND CLETRACS

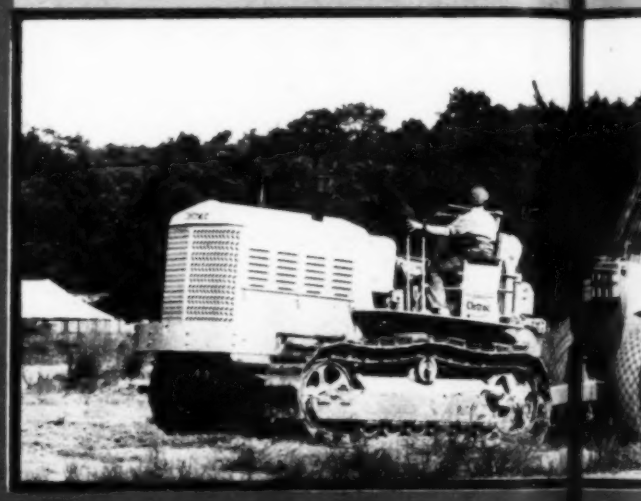
Here a few typical installations, indicative of the wide range of jobs being worked in all parts of the country with Cletracs.

1 RAILROAD CONSTUCTION

Model "A" Cletrac with Heil Bulldozer widening a road bed for double track. Power, speed and the ability to turn under full load makes Cletrac an ideal unit for working on jobs where space is limited.

2 NAVAL BASE CONSTRUCTION

Two Model "F" Cletrac Diesels operating a Heil Twin Cable Scraper working on a Naval Base. More and more contractors are realizing the many advantages of using a pusher unit in conjunction with big capacity scrapers.



3 AIRPORT EXPANSION

Model "B" Cletrac with Sargent overhead shovel loading dirt for expanding and filling in low spots on an eastern airport. There is practically no limit to uses of this compact, highly mobile unit.

ONLY CLETRAC GIVES YOU

*TRU-TRACTION

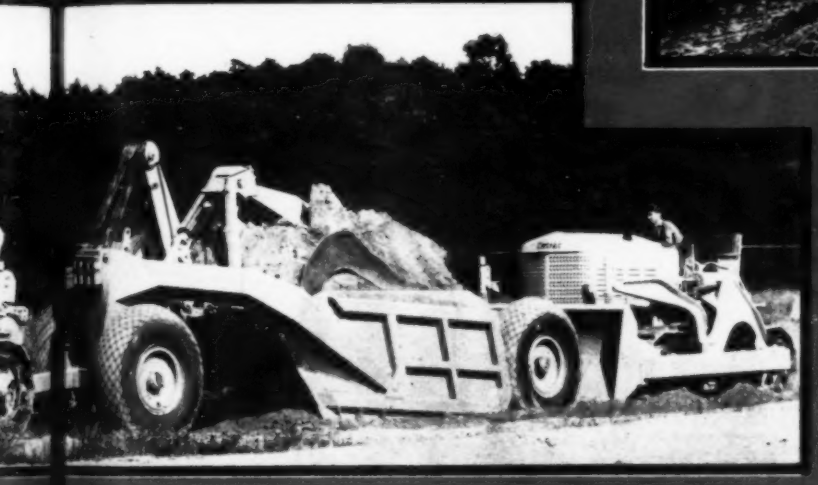
*TRU-TRACTION IS POWER ON BOTH TRACKS AT ALL TIMES

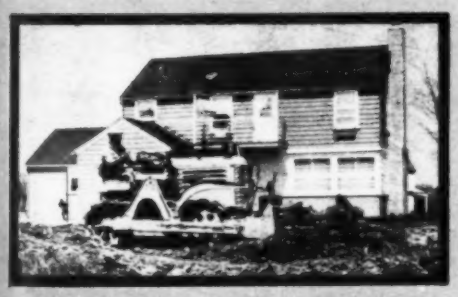
CLETRAC C

CONSTRUCTION ---
ON THE JOB

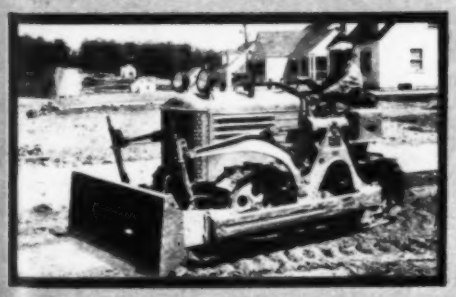
1 ROAD WIDENING

Model "D" Cletrac with Heil cable controlled Scraper widening and rebuilding a secondary road leading to a defense project. The Model "D" has ample power to heap this Heil Scraper every trip.





5
HOUSING PROJECT
Rough Grading
Model "A" Cletrac rough grading property on a housing project.



6
HOUSING PROJECT
Finish Grading
Model "A" Cletrac finish grading property on a housing project.

25th Anniversary 1916 - 1941 CLETRAC CRAWLER TRACTORS

● Cletrac tractors, large and small, gasoline and diesel powered, are playing an important part in moving dirt faster, more economically on a host of varied operations. They're faster because *Tru-Traction enables them to unload and turn without stopping to shift gears. There are fewer delays due to Cletracs' high protected clearance and streamlined undercarriage which eliminates bogging down or getting hung up. They're more economical because of low maintenance cost and more actual producing time. Easy to start from drivers seat—just push button and you're ready to go.

Contractors concerned about saving time on defense projects will find Cletracs faster and more economical on all dirt moving jobs.

THE CLEVELAND TRACTOR COMPANY

CLEVELAND, OHIO

CRAWLER TRACTORS

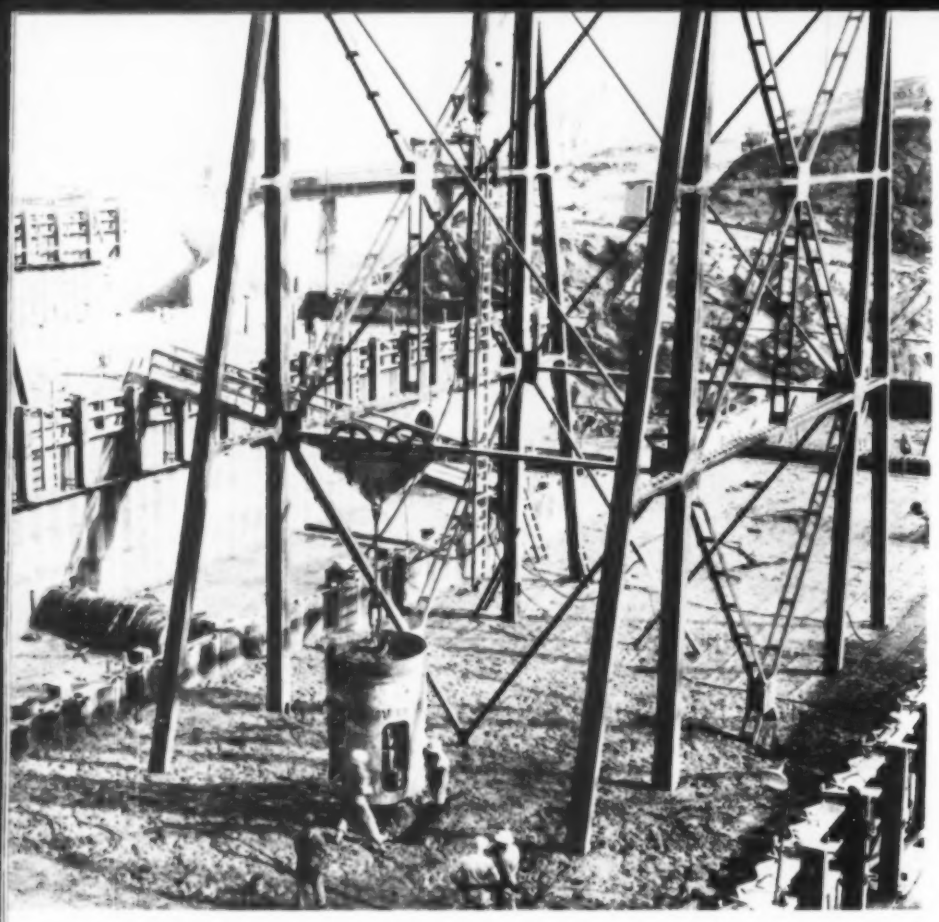
14 to 96 H.P. GASOLINE OR DIESEL

How They Did It

CONSTRUCTION DETAILS

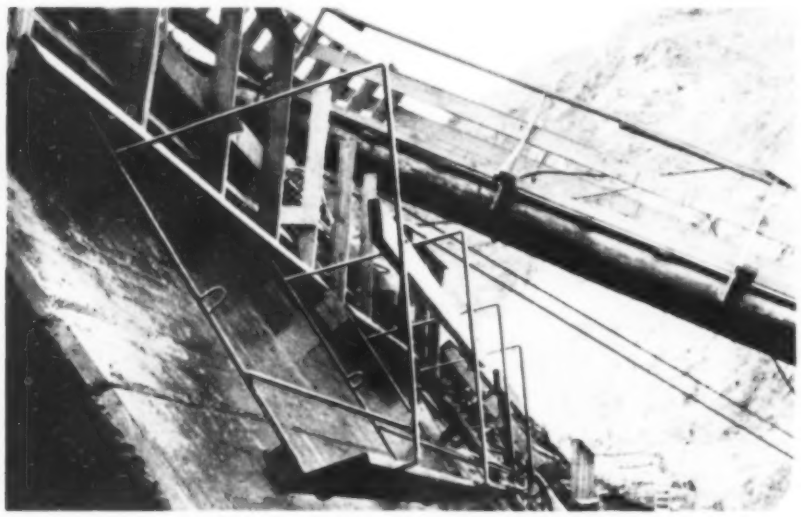
For

Superintendents and Foremen



CONCRETE PLACEMENT at Friant dam, which Griffith Co. and Bent Co. are building for U. S. Bureau of Reclamation in California, is done from tall steel trestle from which 4-cu.yd. bottom-dump buckets are lowered. Concrete is deposited within cantilever forms which eliminate need for struts or tie wires on inside face. Steel cylinder hanging from pipe (top, center) contains sand for sandblasting concrete surface before fresh pour is started.

SCORING OF LIGHT-REFLECTIVE FACES of concrete traffic separator strip on Chicago highway is done with this special tool which corrugates white portland cement faces. All grooves are hand tooled after scoring to insure maximum reflective surfaces.



WORKMAN'S SCAFFOLD is designed and job-built for convenience of men of Pacific Constructors, Inc., who follow up concrete forms at Shasta dam, U. S. Bureau of Reclamation structure in California. Frame of welded steel rods supports platform in horizontal plane. Rig is carried by hooks from wale of concrete form.

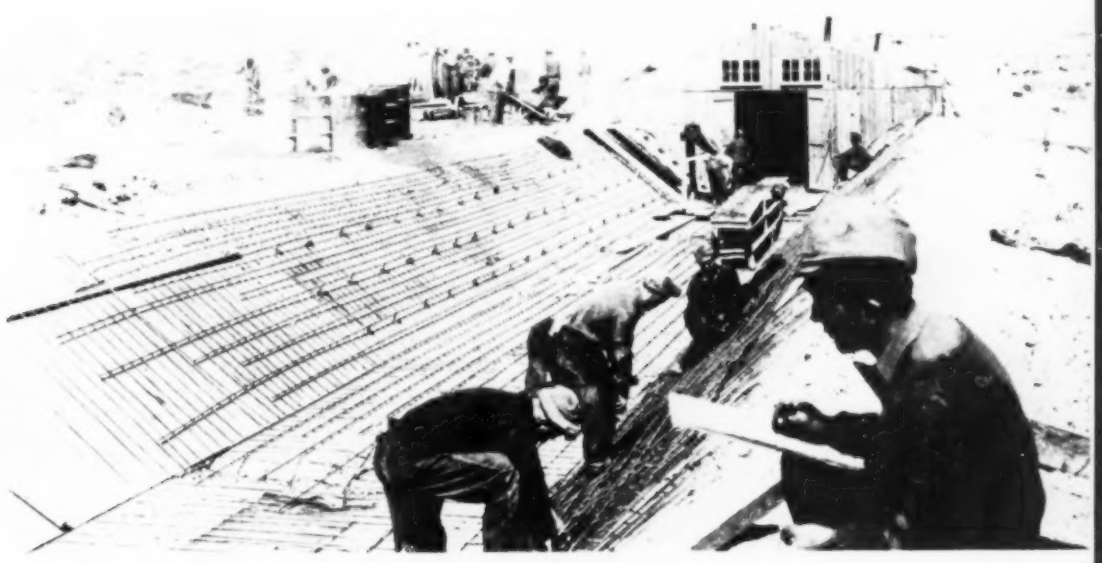
SPECIAL LOG-LOADING BOOM (below) on Link Belt-Speeder diesel crane speeds up operations for Southwest Lumber Mills in McNary, Ariz. Boom 30 ft. long is reinforced to take strain imparted by heels of logs, 50 ft. long and 2-3 ft. in diameter. Grapple is attached to log at point short of center, and log is swung up so that end "heels" against flat under part of boom.

CRUSHED STONE (below) for road construction at Amicola Falls, Ga., is supplied by this Telsmith unit mounted on wheels and hauled by Allis-Chalmers tractor. Outfit owned by C. M. Lytle Construction Co., of Gainesville, Ga., is said to crush 50 cu.yd. per hour.

REMOVAL OF SCALE AND RUST from surfaces of big steel drum gates on spillway at Grand Coulee dam, preparatory to painting, is done with rake-like oxyacetylene torches, ejecting 49 tiny flames spaced ⅛ in. apart, covering 6 in. per stroke. Intense heat of 5,300 deg. F. causes scale to pop off base metal of gates installed by U. S. Bureau of Reclamation.

SPECIAL LAND-CLEARING BLADE, equipped with seven teeth, proves effective device on International tractor for handling stumps, trees and roots on highway and railway relocation near Grand Coulee dam in Washington. Teeth on Bucyrus-Erie bullgrader blade are 2 in. square and are spaced 11½ in. apart.

PROTECTIVE HOOD on scarifier operated at Texas State Highway Department prevents accidents caused by man's foot getting caught between control lever and frame when tripping dogs to let teeth down. Pictures from Clifton Rice, district engineer at El Paso, show scarifier before and after being equipped with safety device.



MOVABLE SHELTER protects placing and curing of concrete canal lining during severe winter weather on U. S. Bureau of Reclamation's Shoshone project in northern Wyoming. Frame building 102 ft. long and 28 ft. wide is made in sections at CCC camp, hauled to site and assembled. Heat is furnished by six coal stoves hung from ceiling. Electric fans circulate warm air throughout building which is pulled ahead, as concreting proceeds, by winch truck.

TRAVELING CONCRETE MIXING AND PLACING PLANT (below) was used by Arundel Corp., of Baltimore, Md., on 4-mi. section of concrete outfall sewer (inverted egg-shaped section, 16 ft. wide and 24 ft. high, inside) completed several years ago at Louisville, Ky. Straddling trench, platform mounted on flanged wheels riding on steel rails, carried pair of Ransome mixers and revolving Universal crane which picked up batch-boxes delivered alongside on railway flat car.

Bituminous Paving APPLIED TO RELOCATED CA

BITUMINOUS SURFACE on relocated highway along Cape Cod canal is widened at intervals to provide parking areas from which occupants of cars can view waterway.

POWER SHOVELS AND TRUCKS moved earth for relocating highway along Cape Cod canal spanned by Sagamore bridge, in background.

ODD DETAIL OF JOB was necessity of providing stepped concrete channel or "herring run" to allow fish access from canal to spawning grounds.

HEAVY GRADING, involving 30-ft. cuts and 60-ft. fills, was required to relocate highway 150 ft. back from widened Cape Cod Canal.

CAPE COD CANAL HIGHWAY

WIDENING OF THE CAPE COD CANAL in Massachusetts by the U. S. Engineer Department five years ago made it necessary for the Massachusetts Department of Public Works to abandon and relocate on higher ground a 3-mi. section of U. S. Route No. 6, a highway closely paralleling the north bank of the inland waterway and connecting Provincetown, on the tip of the Cape, with New Bedford, Fall River, Providence, R. I. and points west. As originally completed in 1914 the canal had a bottom width of only 100 ft. and a water depth of 25 ft. Under the Federal program of reconstruction the bottom of the canal prism was extended to 540 ft. and its depth to 32 ft. The widened canal encroached upon U. S. Route No. 6 as originally located between Bourne and Sagamore, so that the road had to be set back, regraded and repaved.

The highway relocation, 3.1 mi. in length, was done under contract by the Eastern Contracting Co., of Quincy, Mass.,

(Continued on page 96)

MAJOR QUANTITIES AND UNIT PRICES

ITEM	UNIT	Estimated Quantity	Unit Price Bid
Earth excavation	Cu.Yd.	388,000	$0.20
Borrow (ordinary)	Cu.Yd.	8,000	0.20
Reinforced conc. masonry	Cu.Yd.	800	12.00
Broken stone for base course	Cu.Yd.	8,300	4.15
Borrow (gravel)	Cu.Yd.	19,500	0.20
Vertical granite curb	Lin.Ft.	31,330	1.10
Fine grade, roll and finish	Sq.Yd.	242,500	0.20
Multiple cable guard rail	Lin.Ft.	19,500	1.50
Trench excavation	Cu.Yd.	3,600	0.60
Loam barrow	Cu.Yd.	12,200	0.60
Seeding	Sq.Yd.	61,000	0.05
Oiled broken stone	Cu.Yd.	7,120	6.69
Bituminous material (asphalt)	Gal.	205,000	0.115
Catch basins	Each	77	47.00

Total value of contract: $303,077.
Contractor: Eastern Contracting Co., Quincy, Mass.

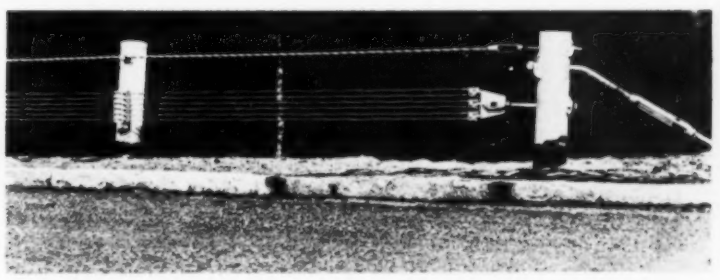
TRACTOR-BULLDOZER OUTFITS and trucks assisted in earth-moving operations.

PRESSURE DISTRIBUTOR applies penetration treatment of hot asphalt to rolled stone surface course.

ALONG CURBS, which are covered to prevent staining, asphalt is applied by hand sprays fed by hose from pressure distributor.

SUPERVISION OF CONSTRUCTION was under JOHN E. TROY (left), district engineer, and F. T. McAVOY (center), construction engineer. Superintendent for Eastern Construction Co. was JOHN POMPEO (right).

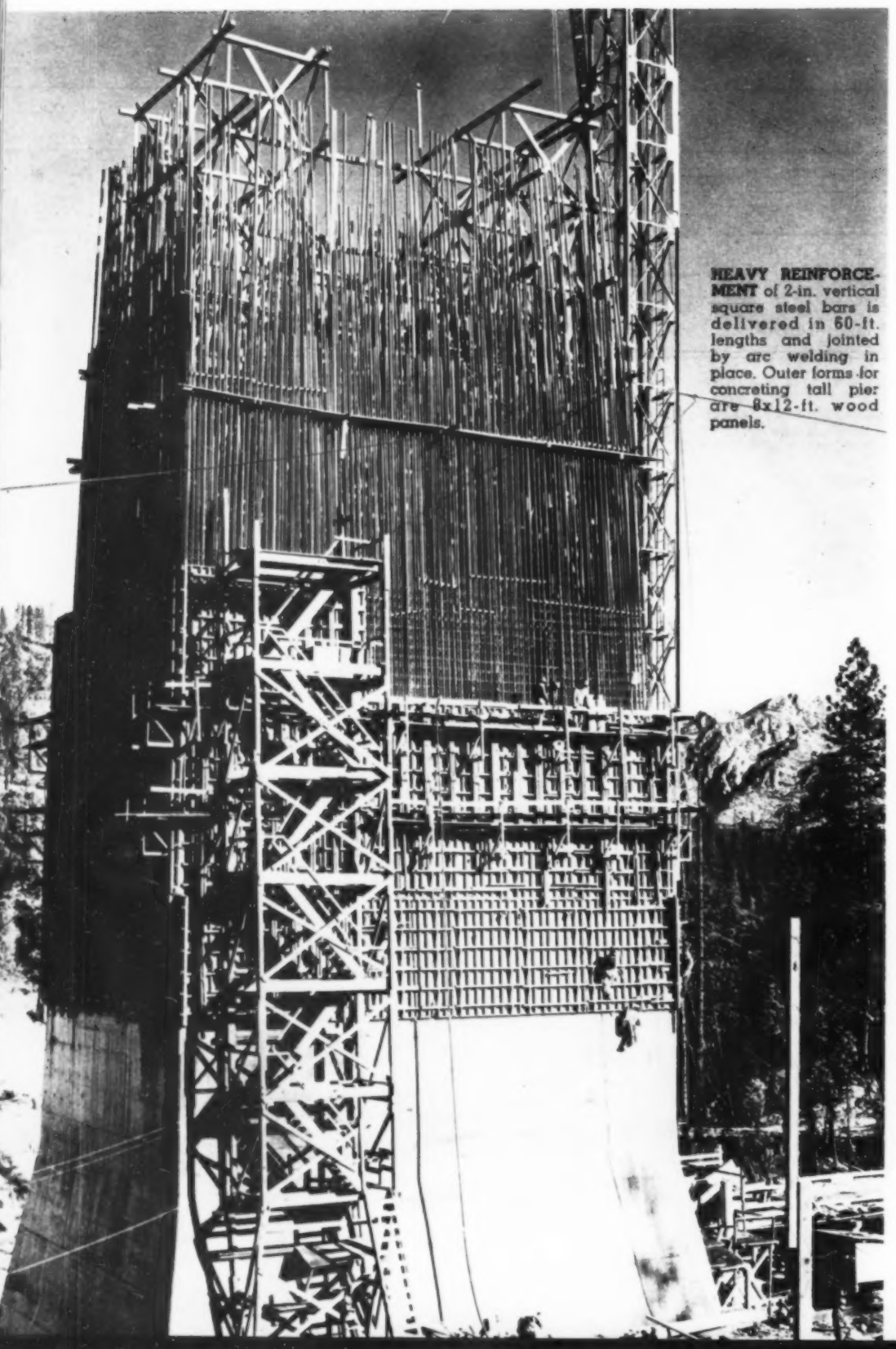
TOP STONE IS OILED by spray from tank truck prior to receiving hot asphalt penetration treatment.



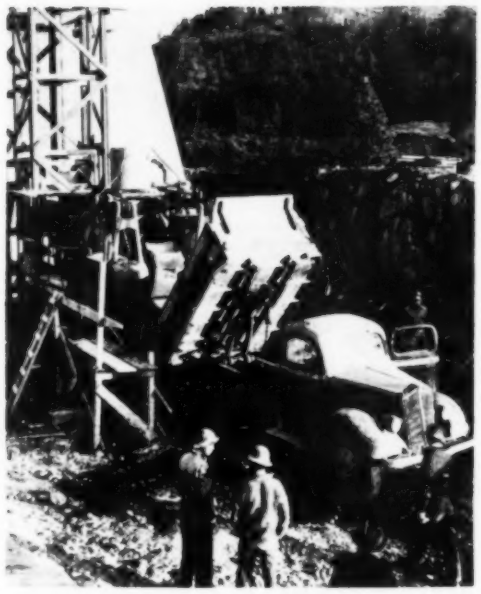
GUARD RAIL is of multiple-strand cable attached to steel shell posts. Project along canal bank required 19,550 lin.ft. of guard rail.

Skyscraper Piers

With Welded Reinforcement Carry Pit River Bridge



HEAVY REINFORCEMENT of 2-in. vertical square steel bars is delivered in 60-ft. lengths and jointed by arc welding in place. Outer forms for concreting tall pier are 8x12-ft. wood panels.



DRY BATCHES OF CONCRETE are trucked to mixer located at base of tower elevator alongside concrete pier.

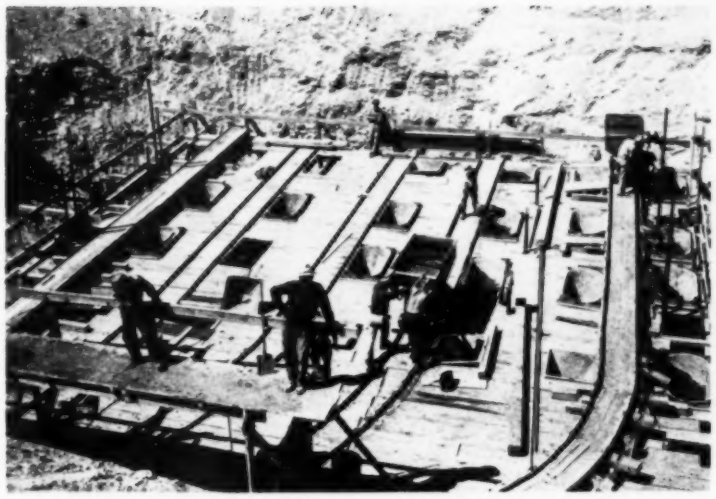
AS TALL AS A 30-STORY SKYSCRAPER are two of the ten concrete piers — 358 ft. and 356 ft., respectively, from base to top — that support Pit River bridge, a double-deck steel truss structure that will carry both railway and highway traffic over a relocation made necessary by the new reservoir created by the construction of Shasta dam, U. S. Bureau of Reclamation project in California. With a length of 4,422 ft., including approach spans, the bridge will have an upper deck 500 ft. above present river level. When the reservoir is filled, the lofty piers will be submerged for almost their entire height.

The largest piers have bases measuring 90x95 ft., from which the tall concrete shafts rise at a batter of 3 in. in 1 ft. for a height of 65 ft. and from that point to the top, at a batter of ¾ in. in 1 ft. In order to economize on the yardage of concrete, the piers are designed with hollow cell compartments equipped with inlet pipes and vents to permit water to fill these spaces when the reservoir level rises. A feature of the tall piers is their heavy reinforcement, to sustain normal loads in addition to earthquake forces, with rows of vertical 2-in. square steel bars jointed at their ends by butt-welding.

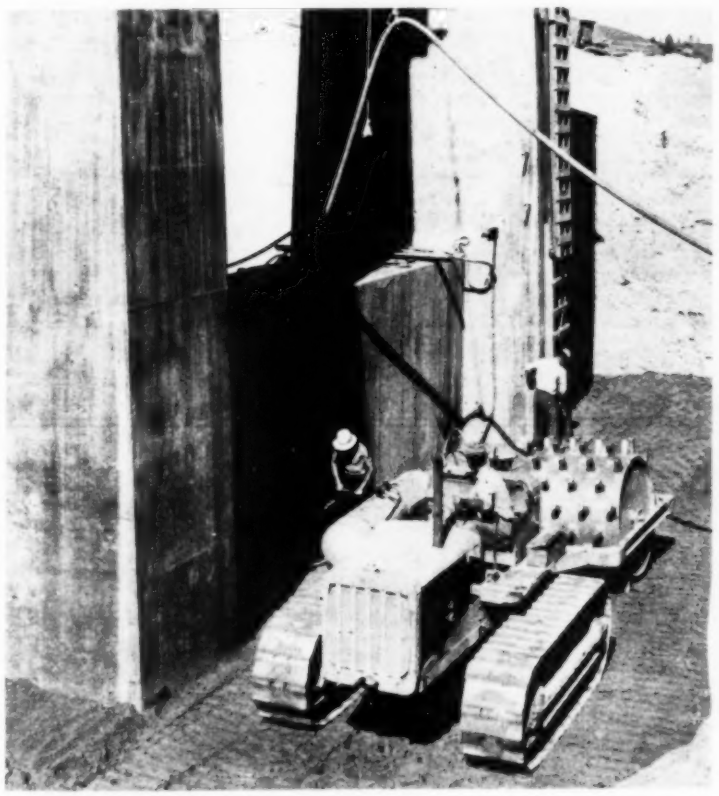
The construction of the bridge piers by the Union Paving Co., of San Francisco, under a $1,138,288 contract, involved the placing of 94,000 cu.yd. of concrete and 10,930,000 lb. of steel reinforcing bars. The steel superstructure was erected by the American Bridge Co. under a bid price of $2,588,354.

From the construction point of view, the main problems were the placing, support and welding of the heavy vertical reinforcing bars and the delivery of concrete to the exceedingly tall structures. Within each pier was erected a control tower of scaffolding with verti-

(Continued on page 97)



FROM WORKING LEVEL PLATFORM concrete raised by tower elevator skip is delivered by cars and buggies into funnel-shaped hoppers at ends of elephant trunks extending down into forms for tall piers.

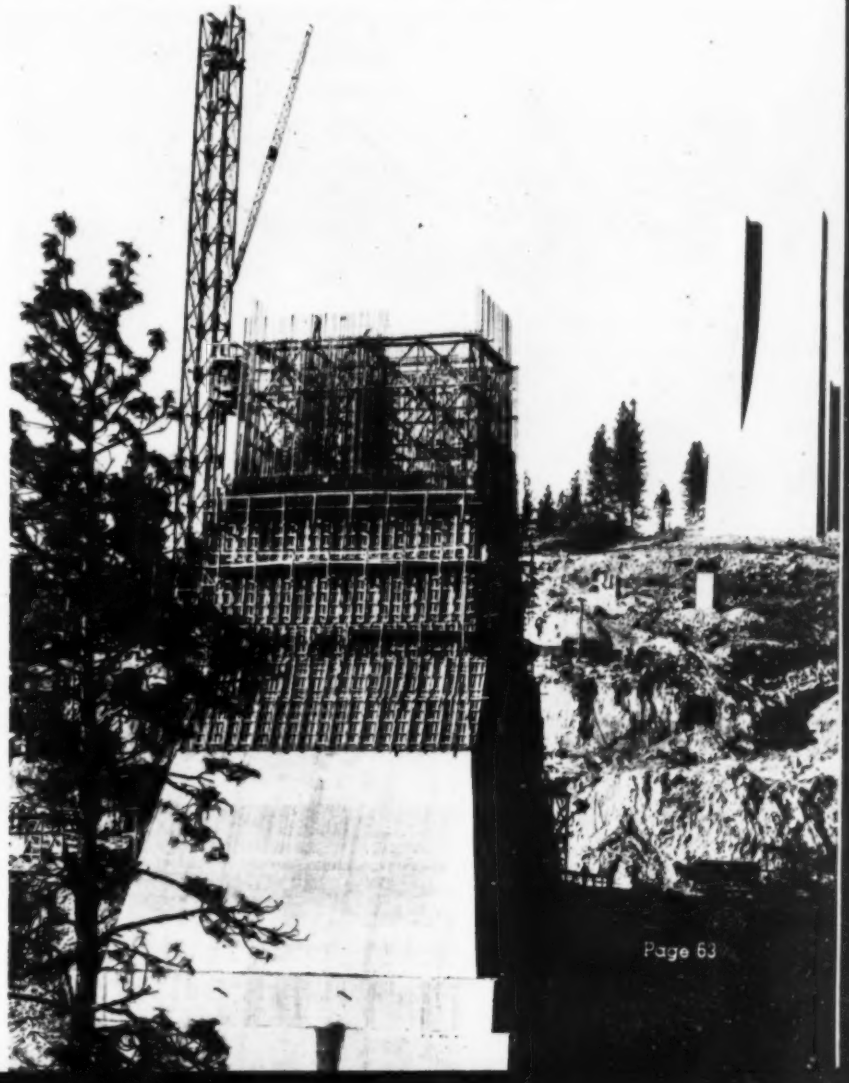


TAMPING ROLLER drawn by tractor compacts fill around base of pier. Suspended air hose feeds hand tamping machines too close to concrete walls of pier for consolidation by other equipment.

IN WELDING 2-IN. BARS, spacing between ends is made uniform by temporary spacer and bars are held in position by clamp with two wedges on each bar.

DOUBLE-DECK PIT RIVER BRIDGE to carry both railway and highway traffic is supported by concrete columns, tallest of which is 358 ft.

STEEL FRAME ELEVATOR TOWER (below) raises concrete in skip to pouring level. Boom rigged on tower and raised periodically as work advances, handles placing of steel reinforcing bars and form panels.



LARGE BRICK UNITS. 8 in. square, are fed to droppers by conveyor. Longitudinal and transverse reinforcement is placed in joints between brick.

Reinforced Brick Pavement

USES 8x8-IN. SQUARE BLOCKS

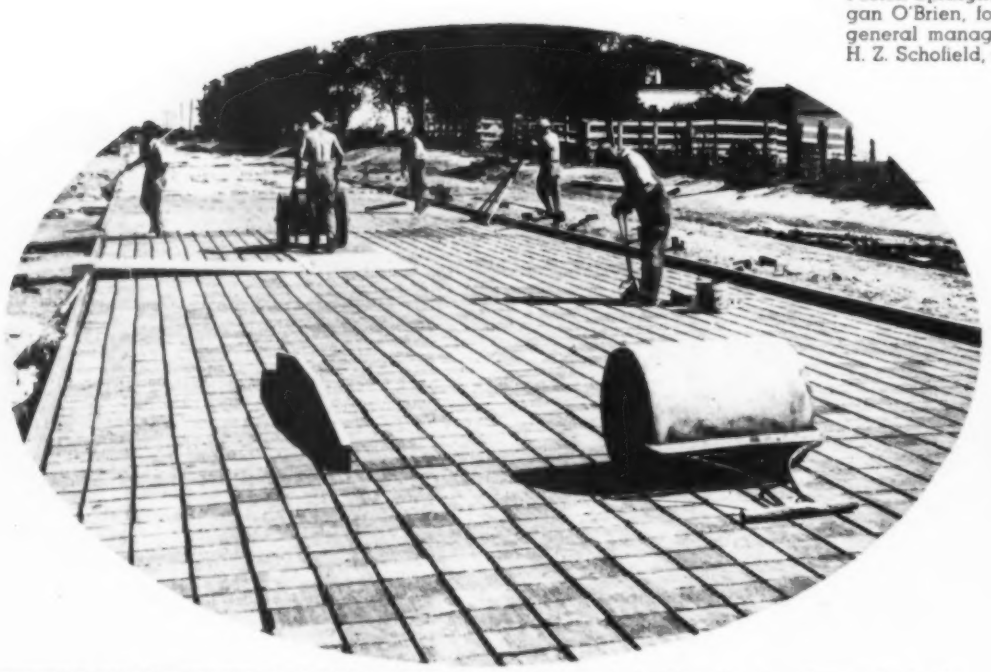
By M. P. O'BRIEN
Civil Engineer
Springfield, Ill.

The accompanying text is from a paper by Mr. O'Brien, presented at the 35th annual meeting in Toledo, Ohio, last January of the National Paving Brick Association.

THE STATE OF ILLINOIS let a contract in the summer of 1940 for a project a little more than a mile in length, in which an improved type of brick, 8x8x3¾-in. in size, was laid with steel reinforcing bars between joints. Features of the large-size block included longitudinal fiber, scored sides, brushed top, and spacing lugs serving also as supports for the reinforcing bars. On 1,000 ft. at one end of this project, 22 ft. wide, the brick were laid in a sand bed placed directly on the subgrade. The 1,000 ft. at the opposite end consisted of a pavement 40

(Continued on page 101)

INSPECTION OF COMPLETED REINFORCED BRICK PAVEMENT in Springfield, Ill., is made by (left to right): Emmett Poston, president, Poston-Springfield Brick Co., who owns patent on brick unit; Morgan O'Brien, former city engineer, Springfield, Ill.; R. L. Worcester, general manager, Purington Paving Brick Co. Galesburg, Ill.; and H. Z. Schofield, research director, National Paving Brick Association.



SECTION OF REINFORCED BRICK PAVEMENT after rolling and checking for smoothness. In background, cement-grout filler is being poured in joints from rubber-tired buggy.

SPECIAL HAND-CLAMP was devised for dropping large-size brick units in place. Each brick unit weighs approximately 19½ lb.

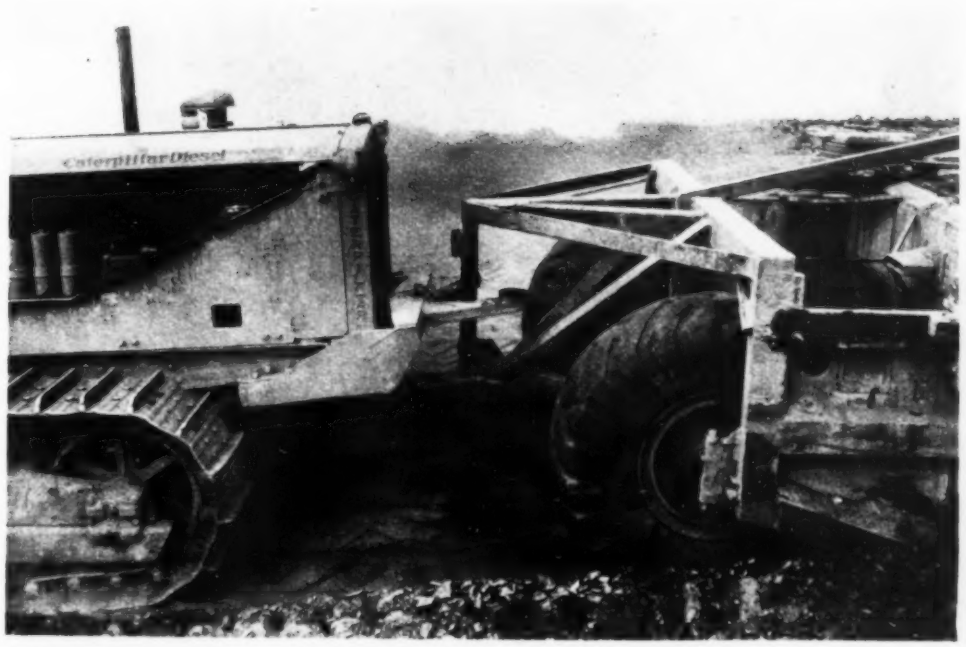
Job-Made Hook Device

INCREASES SCRAPER LOADS

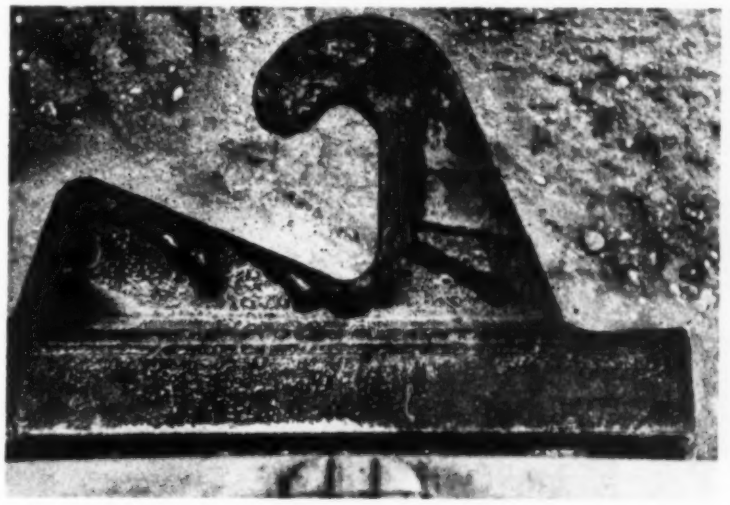
A SIMPLE, JOB-MADE DEVICE added to tractors and carrying-scrapers working in the gravel pit at Friant Dam, U. S. Bureau of Reclamation project in California, has greatly increased the average yardage of the loads picked up by the scrapers. The device gives the advantages of a helper-tractor in the loading area without requiring an extra tractor to be kept there. This is accomplished by welding a substantial pin coupling on the rear end of half of the carrying scrapers and a hook of corresponding strength to the forward end of half of the tractors. The pin is set in a vertical plane, and the hook is a heavy steel plate set in a horizontal plane. When hook engages pin, the connection can be used either to pull or to push the pieces of equipment so joined.

With this arrangement the carrying scrapers, each hauled by a single tractor, work in pairs. The scraper that has the pin at its rear end must lead and

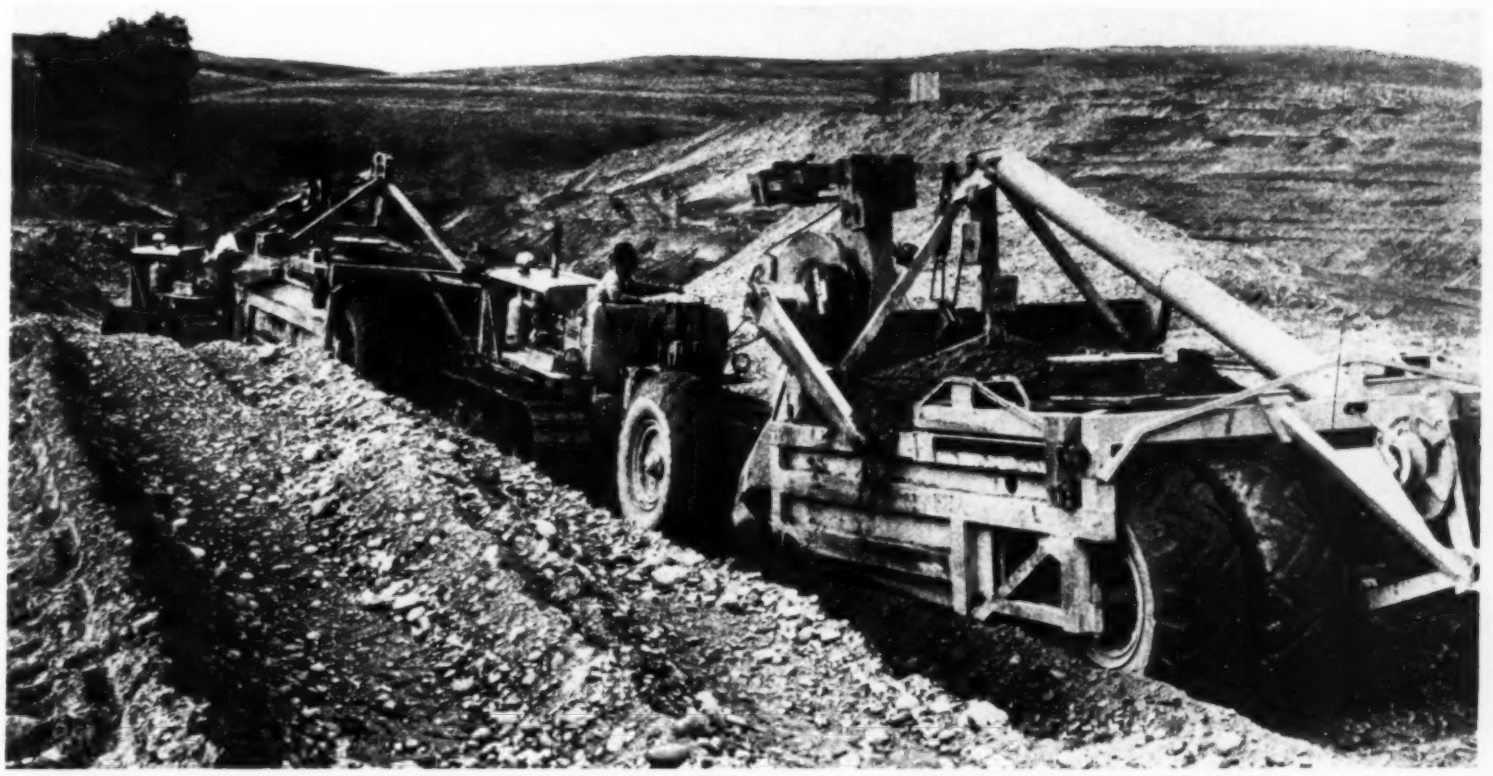
(Continued from page 104)



VERTICAL PIN on carrying-scraper (at the right) is built on as an attachment to standard equipment, as is hook welded to forward end of tractor frame. Hook is made to engage pin when driver gives forward end of tractor sidewise swing to left.



CLOSE-UP OF HOOK, (right), looking downward from hood of tractor, showing shape of hook as worked out to give necessary play for easy coupling and yet to serve well in either tension or compression.



TANDEM OPERATION with two tractors loading rear scraper. Note full loading being obtained by this method.

SMALL TOOLS ON CONSTRUCTION

1

2

3

4

5

1 CUTTING OF CONCRETE MASONRY UNITS at Leestown Terrace, mass housing project built by George H. Rommel Co., contractor, of Louisville, Ky., for 91 families at Frankfort, Ky., is done with Clipper masonry saw driven by electric motor. Saw is equipped with abrasive cutting wheel and has both hand and foot lever controls. Cut is made in plain view of operator, who wears mask as protection against dust from cutting operation.

2 TIGHTENING OF GUY ROPE on wood pole is simplified by use of Coffing safety-pull hoist, which operates on ratchet-and-pawl principle, with load always locked by sprocket and pawls. Tool weighing only 14 lb. exerts pull of ¾ ton. Standard lift is 56½ in.

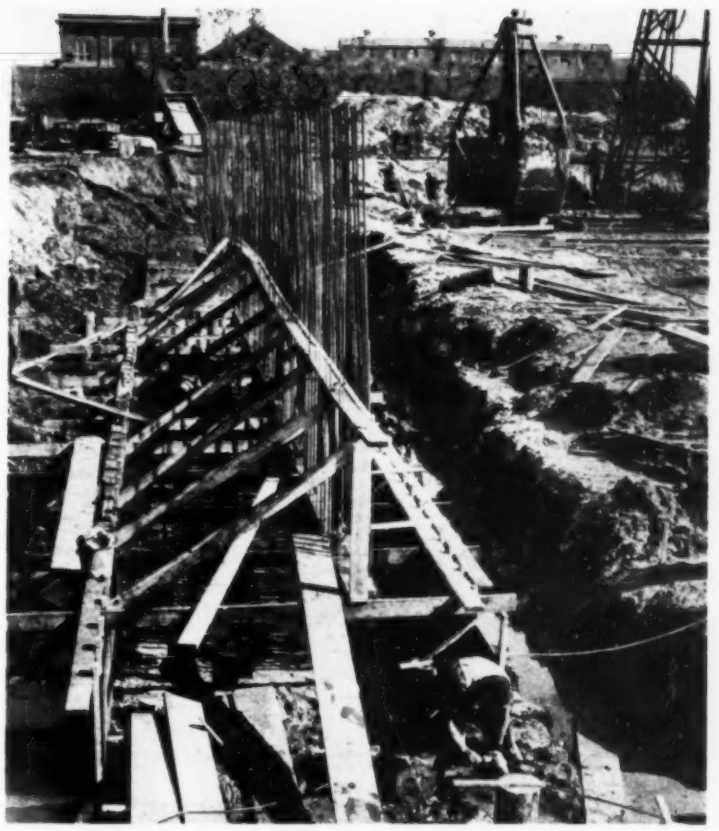
3 CLEANING OF LIMESTONE STORE FRONT is one of many maintenance operations that may be performed by Porter-Cable take-about sander equipped with abrasive belt from 3 to 4 in. wide.

4 MOBILE RIG on ½-ton truck equipped with Weaver auto wrecker winch and chain helped Central Power Co., of Hastings, Neb., install 8-in.-diameter mechanical joint National pipe for high pressure gas service.—Photo from Cast Iron Pipe Research Association.

5 UTILITY PLATFORM is designed for quick attachment to wood, metal or concrete poles for maintenance or repair work. This Kearney unit is available with either 24- or 30-in. board and sustains dead weight of more than 750 lb. Breakdown load for platform is more than 1,700 lb.

INDEPENDENT STORAGE AND PRESSURE AUGMENT

Navy Yard Water Supply



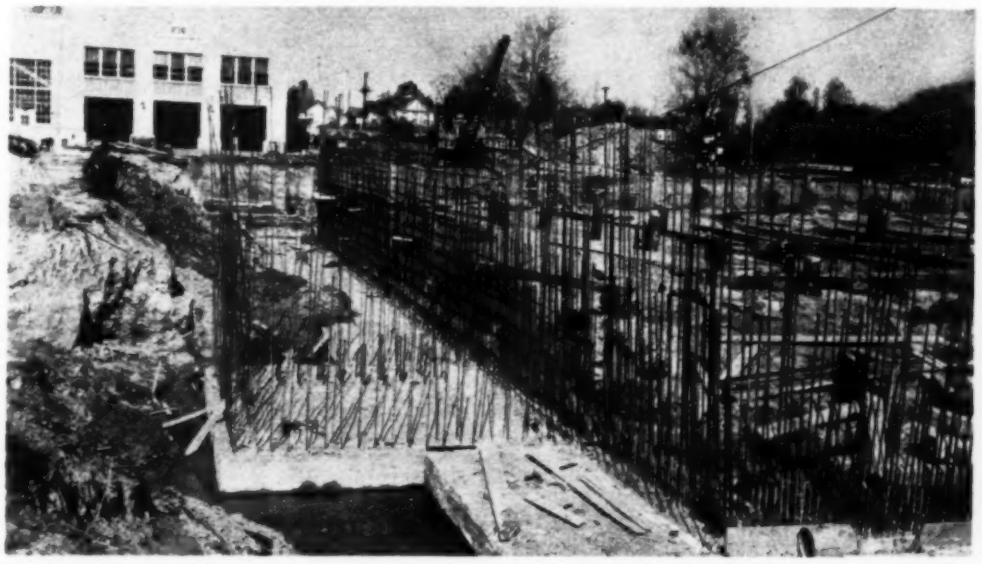
WALL REINFORCEMENT is anchored to steel rods installed in drilled holes through pile butts. Clamshell bucket dropping toward excavation at right is digging trench to drain wall footing for concreting.

TO AUGMENT THE NORFOLK NAVY YARD'S WATER SUPPLY, the Bureau of Yards and Docks of the Navy Department has created inside the reservation a supplemental water supply consisting of a covered concrete reservoir constructed by C. W. Lockwood, contractor, Hampton, Va., and an elevated steel tank erected by the Chicago Bridge & Iron Co., thus providing total reserve storage of more than 2,000,000 gal. The reservoir, 161x161 ft. by 14 ft. deep, rests on about 560 untreated wood piles averaging 60 ft. long driven to 20-ton required bearing through strata of sand, shell, marl and clay. All of the strata except a sand top layer contained a large amount of mud. E. R. Bonney, subcontractor, Norfolk, Va., put down the piles with a Vulcan No. 1 5,000-lb. single-acting steam hammer mounted in the leads of a skid rig.

Construction of the reinforced-concrete reservoir involved 145 tons of steel bars and about 2,000 cu.yd. of concrete delivered in 2½-yd. batches by truck mixers from the Portsmouth plant of the Southern Materials Co. Reservoir bottom is just about at high tide level, and the tops of the piles are embedded in the concrete base mat. To provide some additional resistance against anticipated uplift, horizontal steel rods were installed in the inner row of piles sup-

(Continued on page 92)

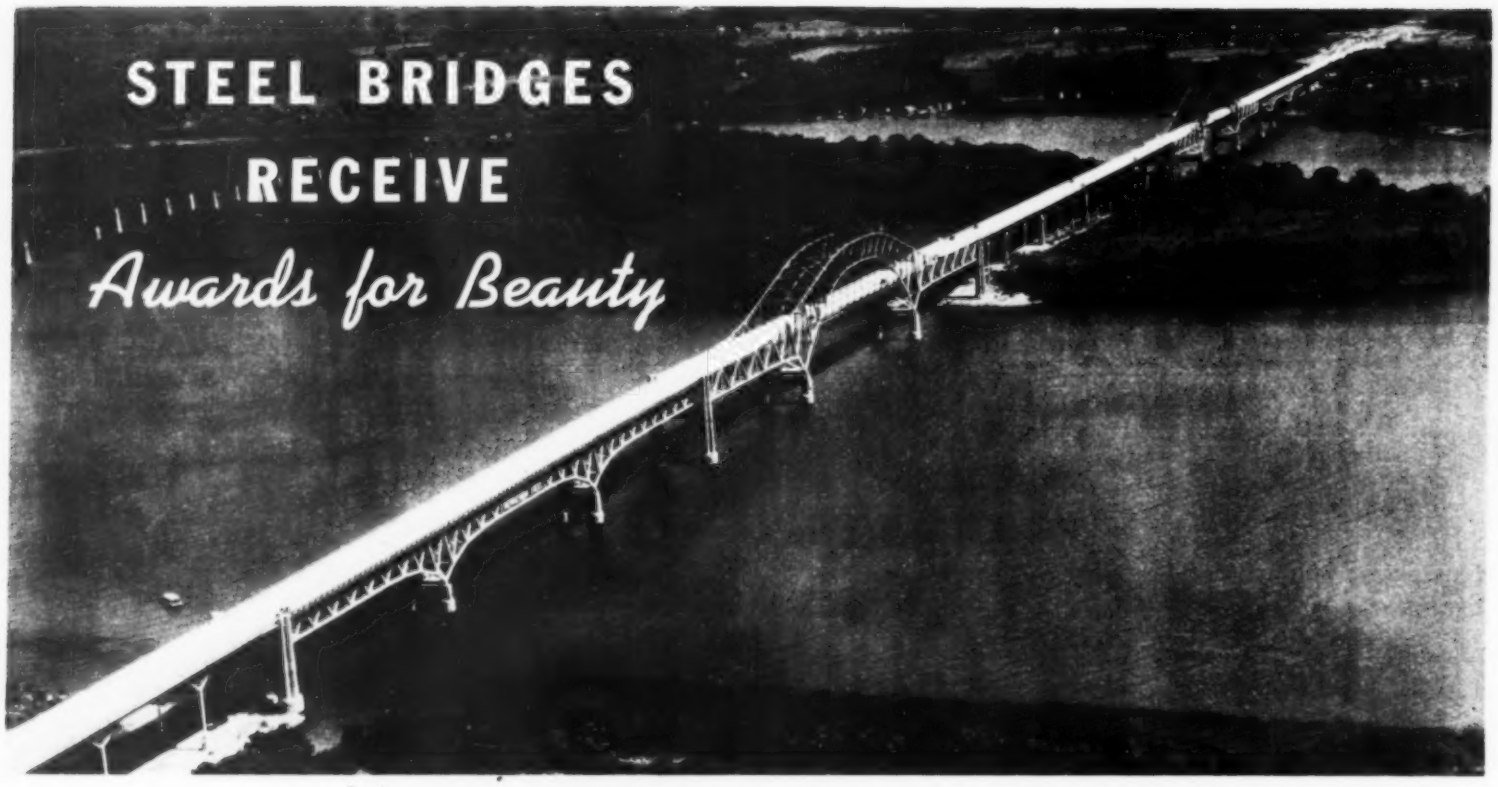
HORIZONTAL HOLES for anchor rods are drilled with 1¼-in. bit by Black & Decker electric drill in pile butts of inner row under wall footing.



REINFORCED-CONCRETE FOOTINGS include pile-supported slab to carry pump delivering water from reservoir to elevated tank. Concrete is covered with top blanket of clay for curing. Rain water has collected in excavation.

RESERVOIR FOUNDATION of 560 untreated wood piles averaging 60 ft. long is installed by skid rig which is here raising long stick into leads for driving by 5,000-lb. single-acting steam hammer.

STEEL BRIDGES RECEIVE *Awards for Beauty*



SUSQUEHANNA RIVER BRIDGE between Havre de Grace and Perryville, Md., is winner of Class A, for monumental bridges.

THE THIRTEENTH ANNUAL AWARDS for the most beautiful bridges built of steel during 1940 were announced May 21 by the American Institute of Steel Construction as follows:

Monumental Bridge (Class A): Susquehanna River bridge between Havre de Grace and Perryville, Md.

Medium-Sized Bridge (Class B): Dunnings Creek bridge on Pennsylvania Turnpike in Bedford Township, Pa.

Small Bridge (Class C): Klamath River bridge at Orleans, Calif.

Movable Bridge (Class D): Oceanic bridge over Navesink River between Locust Point and Rumson, N. J.

For purpose of classification all bridges costing $1,000,000 or more were grouped in Class A; bridges costing less than $1,000,000 but more than $250,000 to build were grouped in Class B; bridges costing less than $250,000 were grouped in Class C, and all movable bridges were placed in fourth class.

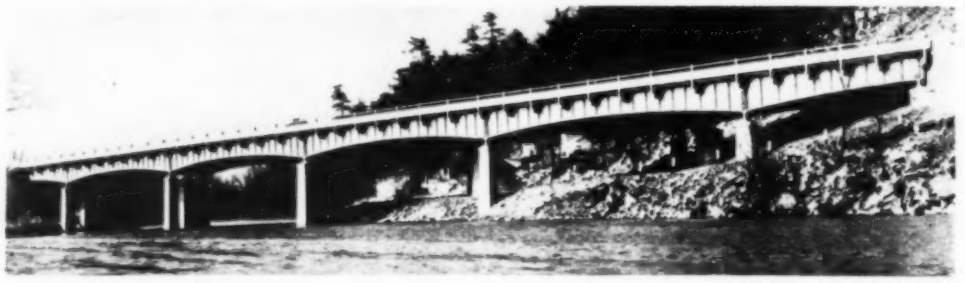
Following is a description of the bridges selected for prize or mention:

SUSQUEHANNA RIVER BRIDGE —Between Havre de Grace and Perryville, Md.; total cost, $4,085,000; engineers, J. E. Greiner Co.; fabricators, Bethlehem Steel Co.; owner Maryland State Roads Commission; span lengths, 53 spans of a total length of 7,618 ft., abutment to abutment.

DUNNINGS CREEK BRIDGE — Pennsylvania Turnpike in Bedford Township, Pa.; total cost, $260,000; engineers, Parsons, Klapp, Brinckerhoff & Douglas; fabricators, American Bridge Co.; owner, Pennsylvania Turnpike Commission; span lengths, 4 spans at 96 ft. and 2 spans at 48 ft.; total length, 480 ft. between abutments.

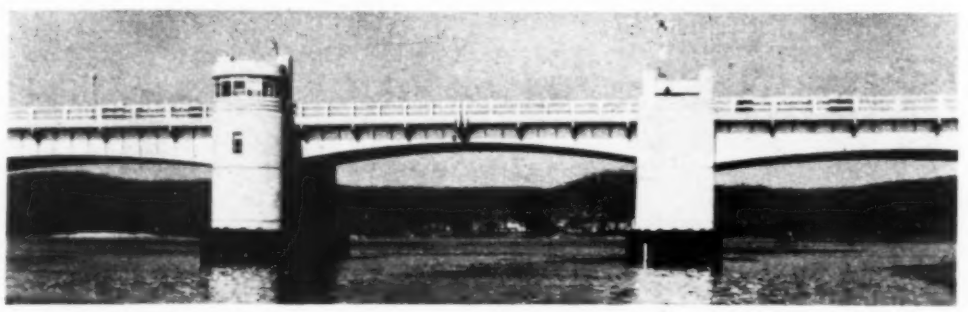
KLAMATH RIVER BRIDGE—Orleans,

(Continued on page 100)



DUNNINGS CREEK BRIDGE on Pennsylvania Turnpike, in Bedford Township, is winner of Class B, for medium-sized bridges.

KLAMATH RIVER BRIDGE in Orleans, Humboldt, County, Calif., is winner of Class C, for small bridges



OCEANIC BRIDGE over Navesink River between Locust Point and Rumson, N. J., is winner of Class D, for movable bridges.

Present and Accounted For

A PAGE OF PERSONALITIES

AWARD FOR RESCUE WORK which saved life of man buried alive by cave-in while shoveling sand in hopper at Shasta dam, California, is made to NESTOR A. TAKALA, (right) inspector for U. S. Bureau of Reclamation, to whom RALPH LOWRY, construction engineer, presents President's Medal of National Safety Council. Citation was for "presence of mind and skill in performing resuscitation" of B. S. Hodges, a fellow worker. Accident occurred in hopper at end of 10-mi. long belt conveyor which delivers sand and gravel from Redding to Shasta dam.

PROGRAM COMMITTEE CHAIRMAN for 20th annual convention of Western Association of State Highway Officials which was held at Casper, Wyo., June 17-20, is C. F. SEIFRIED, chief engineer, Wyoming State Highway Department and vice-president of W.A.S.H.O.

AT PRADO DAM. U. S. Engineer Department flood control project in California, E. E. ASHLOCK, (left) superintendent for Prado Constructors, Inc., confers with PAUL HACK resident engineer for Corps of Engineers, U. S. Army.

DIZZY WALK is completed by HOLTON D. ROBINSON, 78-year old member of firm of Robinson & Steinman, consulting engineers, of New York, during examination of wrecked Tacoma Narrows Bridge, Washington. Mr. Robinson made 6,000-ft. crossing on one of 18-in. diameter suspension cables high above water in arm of Puget Sound.

James Bashford Photo

PROJECT MANAGER for Tennessee Valley Authority's Fort Loudon dam is C. E. BLEE, who had served in similar capacity at Hiwassee dam.

NEW PRESIDENT of Turner Construction Co., New York, one of leading contracting organizations in country, is J. ARCHER TURNER, formerly executive vice-president, who succeeds his brother, Henry C. Turner, founder of company, and now chairman of board. New president, graduate of Swarthmore, has been identified with building business for 35 years, including service as general superintendent for Turner organization in Philadelphia territory.

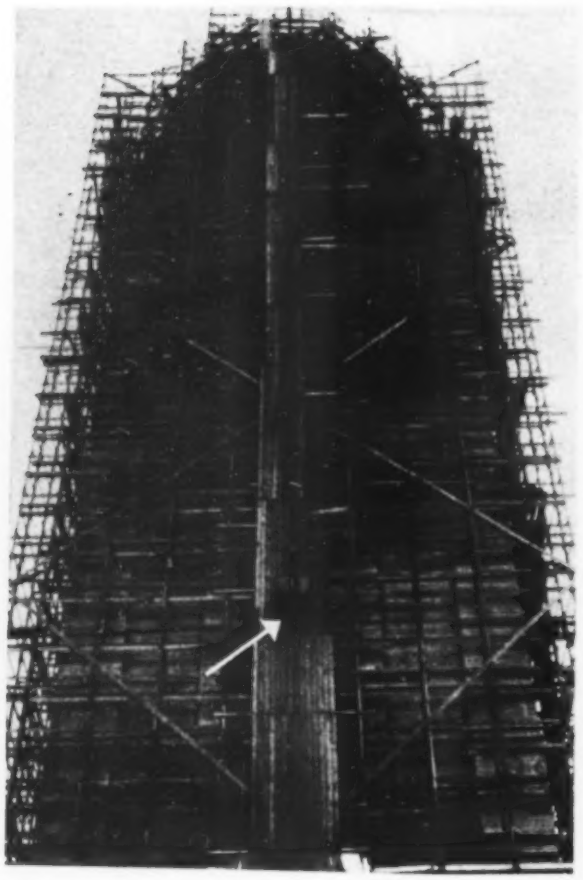
Photo, Blank & Stoller

NEW STATE HIGHWAY ENGINEER of Indiana is EARL B. LOCHRIDGE, who succeeds Merton R. Keefe, now serving with Russel B. Moore department since 1919 as engineer in bridge Engineering Co. Mr. Lochridge has been with section, district engineer, assistant engineer of maintenance and assistant chief engineer

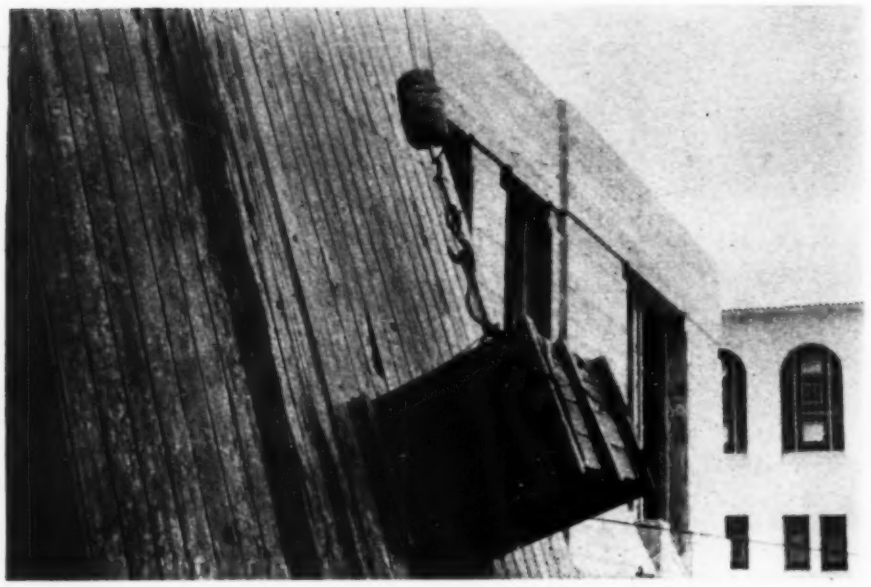
N. Y. STATE HIGHWAY CHAPTER of Associated General Contractors of America has elected as its new president DWIGHT W. WINKELMAN, of Syracuse, N. Y., head of construction organization that bears his name.

Planked Strip on Scaffold

FOR DELIVERING BUILDING MATERIALS



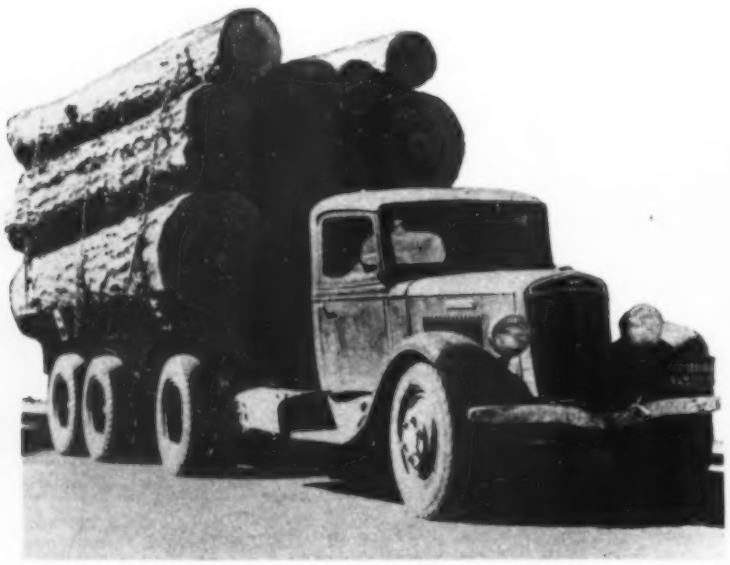
LOOKING UP toward top of tower. Box (indicated by arrow) can be seen part way up.



NEAR BOTTOM planked strip is not vertical, as it is in tower portion. Note concrete weight for returning empty hook.

A PLANKED STRIP on exterior scaffolding aided George Wagner, San Francisco contractor, in the delivery of materials for constructing the Hoover Library on War, Revolution and Peace at Stanford University, Calif. The tower of this structure is 279 ft. high and construction materials, other than concrete, were raised by a simple exterior hoist operated by a gasoline engine at the bottom.

Essentially, the rig is a cable passed through a sheave at the upper end of a planked strip that was carried up the outer face of the scaffolding as it was erected. Bundles of lumber slid along the planks as they were hoisted and a concrete weight brought the empty hook down after the materials were unloaded. Loads ordinarily went up one floor above their destination so that a guide rope hanging below the load could be snared by a piece of hooked reinforcing steel in the hands of workmen. Then the signal to lower slowly was given and as the load came down it was swung into a landing on the staging or in through a window. For sending up small items it was found convenient to use a cable-bound box slung from the hook. Loads up to 1½ tons were handled by this rig.

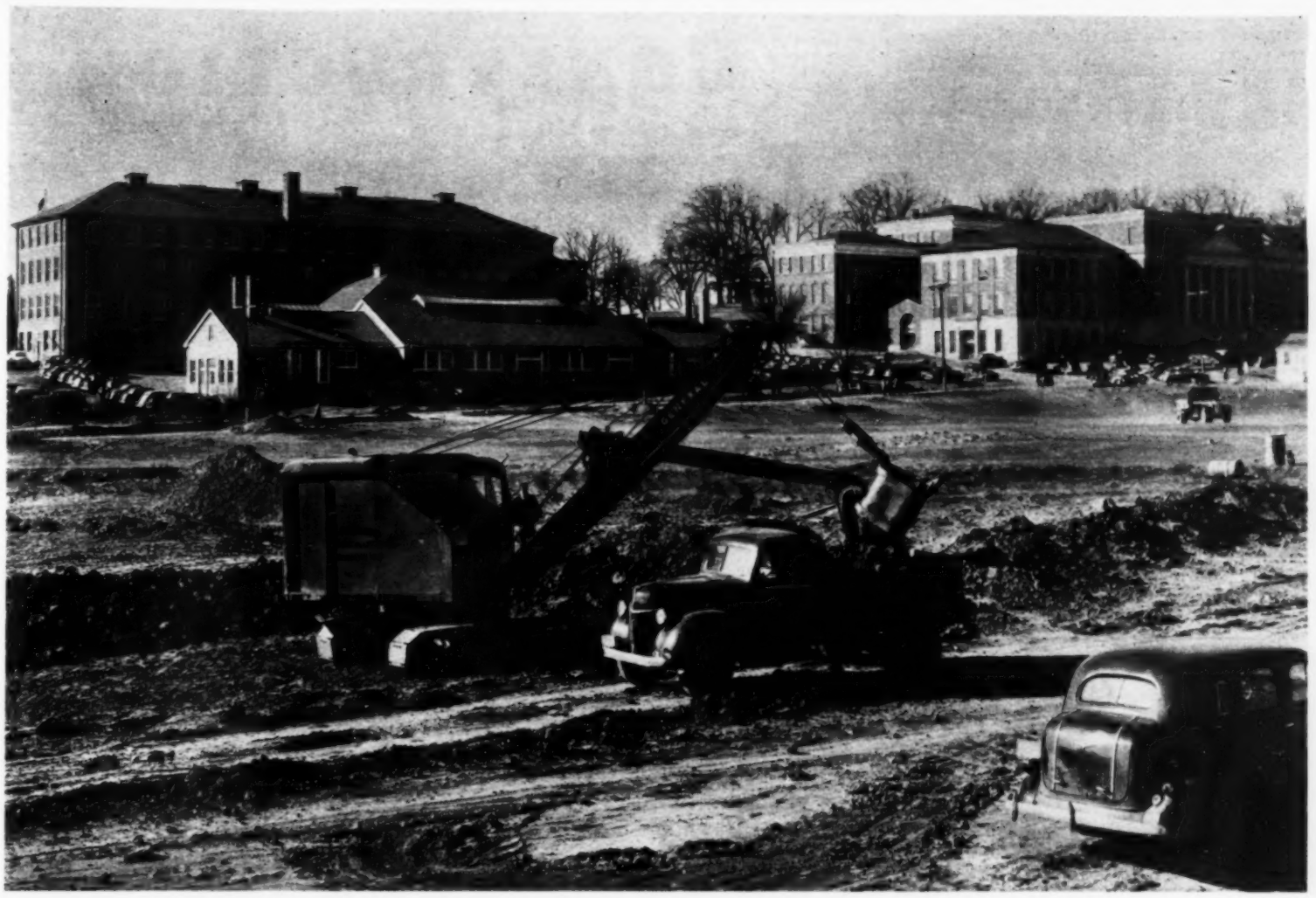


LOADS LIKE THIS are daily moving over some of Oregon's highways on headways of 1½ min.

LOGGING WITH *Motor Trucks*

ROAD CONTRACTORS who operate in the State of Oregon have to build pavements that will hold up loads like this one. The legal limit is 18,000 lb. per axle and the log handlers load their trucks and trailers right up to the limit. Pavements that stand up under this loading are believed to be satisfactory for military purposes.

Logging by motor truck has increased in Oregon by leaps and bounds in the last year or two. More than one third of the total tonnage carried by Oregon roads consists of timber products. There are some state highway routes on which heavily loaded logging trailers move on average headways of 1½ min. throughout the daylight hours. Under conditions that now obtain in many parts of the state, logs can be hauled by truck cheaper than by rail, and hence a large part of the log movement has swung from railroads to highways.



GENERAL

Model 307 Shovel removing top soil and grading grounds of the University of Maryland at College Park, Maryland, for a parking field near extensive new buildings. B. C. Millard of Branchville, Maryland is the contractor.

THE GENERAL GOES TO COLLEGE

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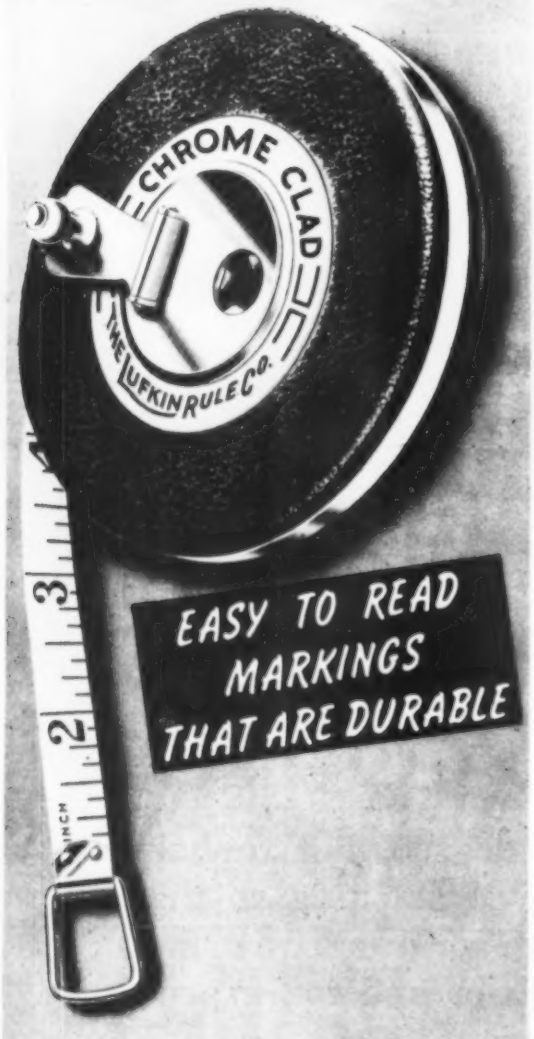
THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

"LEADER"—
CHROME CLAD STEEL TAPES
FOR *busy* CONTRACTORS



Tired of trying to use a hard-to-read, old fashioned steel tape? Then now's the time to get a new Lufkin "Leader"—the tape with the Chrome Clad line that contractors everywhere are praising. Jet black markings show up prominently against a satin-chrome surface that won't rust, crack, chip or peel. The "Leader" will be your most useful tool. Order it from your dealer today. Write for free Catalog.

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CONSTRUCTION EQUIPMENT NEWS

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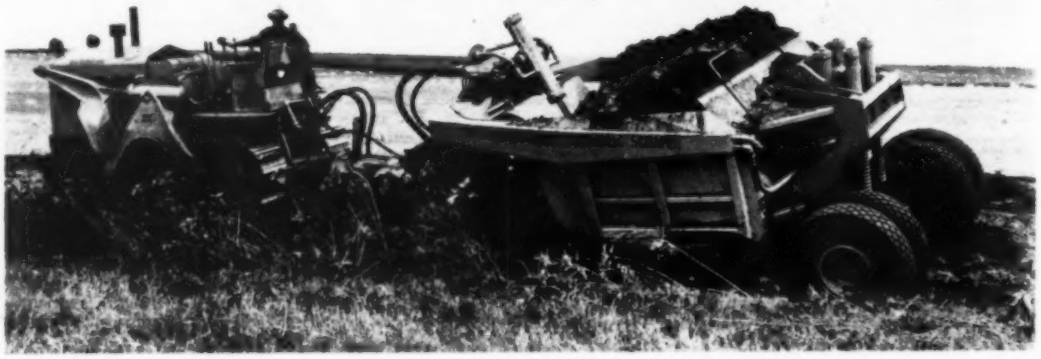
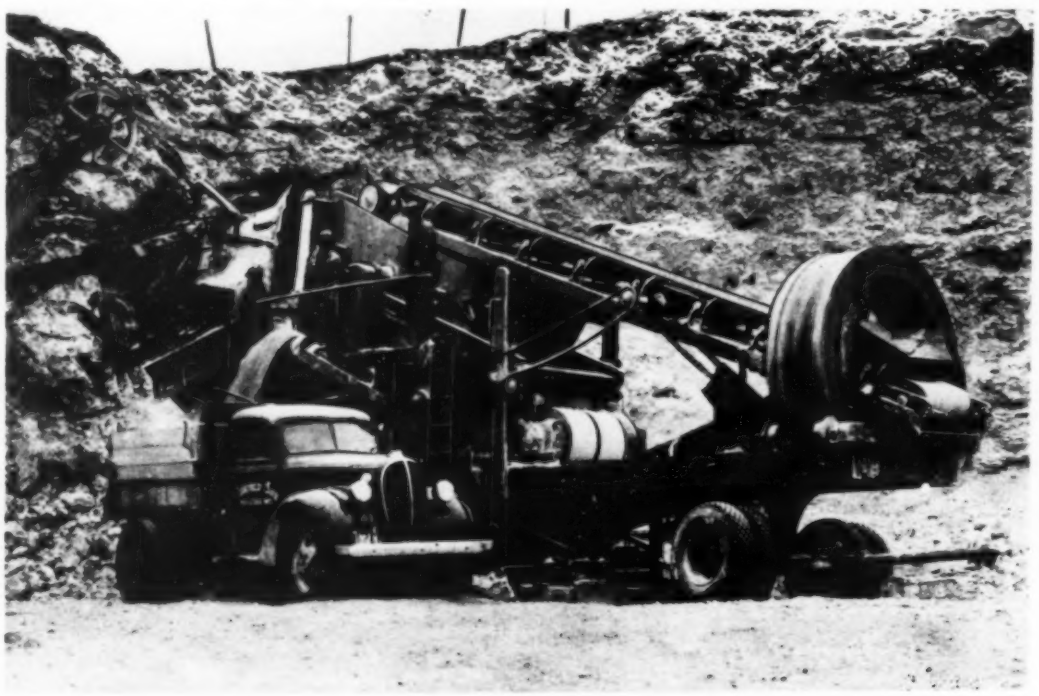
Review of Construction Machinery and Materials for JULY, 1941



HYDRAULIC SCRAPER. 12-cu.yd. capacity, has cutting width of 8 ft. 8 in. plus hydraulic operating system that opens and closes front gate, raises and lowers scraper bowl and operates rear push-out apron. Three levers mounted on back of tractor seat provide operator with finger tip control. Each lever connects with scraper control valve by flexible armored cable. Operator merely moves levers back and forth to raise or lower hoist pistons for scraper action.—**The Heil Co., Milwaukee, Wis.**

★ ★ ★

PORTABLE QUARRY PLANT. capacity 100 to 130 yd. per hour, is equipped with jaw crusher for primary reduction and "two-in-one" roll crusher, one-half of each roll being ¾ in. diameter smaller than other. Secondary reduction is accomplished in two steps, smaller of divided rolls giving initial secondary crushing and other half fed from second deck of 4x8-in. vibrating screen giving final secondary crushing, thus permitting material to pass through in continuous stream. New roll principle said to give larger capacity, combining output of two roll crushers in single unit, also assuring saving in weight. Crushing cycle further speeded up by use of Universal rotovator, a rotary elevator, an underslung



conveyor and by other short cuts in conveyor system which are claimed greatly to minimize handling from feed hopper to finished material delivery conveyor and to reduce overall weight. Conveyor arrangement also reduces overall length and moving height, lowering center of gravity and permitting easier maneuvering into place on quarry floors. Powered by 95-hp. Caterpillar diesel tractor equipped with spline shaft power take-off with Universal joints for attachment to main jack shaft on truck. Sheave and V-belts for driving plant are provided. "Pacemaker" is available with 18x24-in. jaw crusher and 30x16-in. or 24x16-in. rolls, or 24x-16-in. rolls with one split; also with 20x36-in. jaw crusher and either a 30x18-in. or 40x20-in. standard roll crusher or a 30x16-in. crusher with new two-in-one roll.—**Universal Crusher Co., Cedar Rapids, Iowa.**

WHEN MINUTES MEAN DOLLARS
— don't gamble on oil

Keep your Diesels running on *NEW*

SHELL RUDIS OIL

FOR HEAVY DUTY

ACITY excavation . . . time limit . . . your Diesel lubricating oil folds up! Why take chances? Tests made by competent, independent engine authorities in the laboratory, in test engines, under the most severe temperature and operating conditions, prove that NEW Shell Rudis Oil . . .

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SHOVEL work before noon, CRANE work after—
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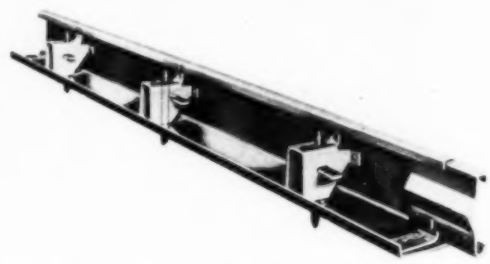
Full data on the convertible MICHIGAN given in Bulletin T . Write for your copy today.
3/8YD
1/2YD

HEAVY-DUTY ROAD FORMS, said to insure increased rigidity and greater accuracy of alignment, to reduce high spots and save costly handwork, are made of carbon steel plate 7/32 in. thick, instead of usual 3/16 in. Improved design triple-braced stake pockets are riveted at 5 points to base-face-top of form, said to enable unit to hold true to line



and grade and to resist distortion under heavy-duty, high speed spreading and finishing equipment. Section 9x8 in. weighs but 21 lb. more than ordinary 3/16-in. forms. Other features (1) Joint plate completely telescoped with both top rail and base guide insuring perfect alignment, maximum rigidity of lock and providing support for outside edge of top rail; (2) lock plate extends 3 in. from face of form for easier hammering when locking or unlocking; (3) eliminates 90 per cent of breakage; (4) chamfered ends facilitate setting of curves. Jaeger "Duo-Rails," for centering load when needed, fit this standard form—**Jaeger Machine Co., 800 Dublin Ave., Columbus, Ohio.**

★ ★ ★

PNEUMATIC-TIRED LOADER for use where ground conditions are reasonably satisfactory has capacity of from 3 to 5 cu.yd. per minute in heavy-duty work up to handling larger sizes of crushed stone. Weight distribution in relation to front and rear axle loading engineered so that 9.00-20 single tires in front and dual tires of same size in rear all carry approximately equal loads. Designed on 7-ft. wheelbase with 8 ft. 10½-in. width over rubber in rear and 6 ft. 9¼-in. tread width in front. Speed 5½ m.p.h. Two speeds, forward and reverse. Power crowding drive geared for 18 ft. per

minute. Powered with 50-hp. gasoline motor. Double-strand manganese steel block link elevator chain, manganese steel elevator sprockets and manganese steel feeding heavy-duty propellers. Heavy plate buckets, 22 in. wide. Heavy-duty clutch and gear box in which all shafts are mounted on Fafnir deep-grooved ball bearings of external self-aligning type. Motor-truck-type running gear with standard Saginaw recirculating worm nut and sector gear steering device. Pedal-operated traction brake, with latch. All contols grouped on operator's platform. Clearance of 11 ft. 4 in. under discharge chute at 35 deg. setting takes care of high truck bodies. At 50-deg. discharge angle setting of chute, clearance is 10 ft.—**George Haiss Manufacturing Co., 139th St. & Canal Place, New York, N. Y.**

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THE SAFER BLASTING AGENT

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Contractors Prefer STERLING WHEELBARROWS

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FOR concrete work, Sterling Models S-17, S-18 and S-19 are selected by leading Contractors because of these outstanding features:

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Complete stocks available from Warehouses and Distributors in principal cities.

STERLING WHEELBARROW COMPANY
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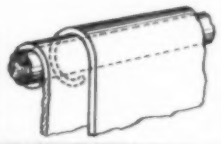
An Exclusive Sterling Feature
Where tray sheets lap, both thicknesses are folded over the continuous butt-welded reinforcing rod, thus giving additional rigidity and strength.



Power to dig . . . power to g-r-a-b . . . power to bite out a heaping load—a PAY LOAD — that's Haiss performance. It's built into the bucket. Weight where weight counts. Non-weave rigidity; big-diameter pins, engineered head frame. And counterweight sheaves that are up, out of the dirt. All sizes available. Wire or write for prices. Descriptive Bulletins on request. . . .

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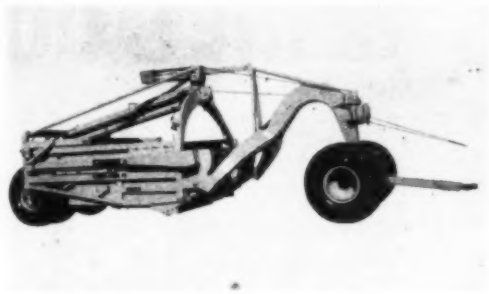
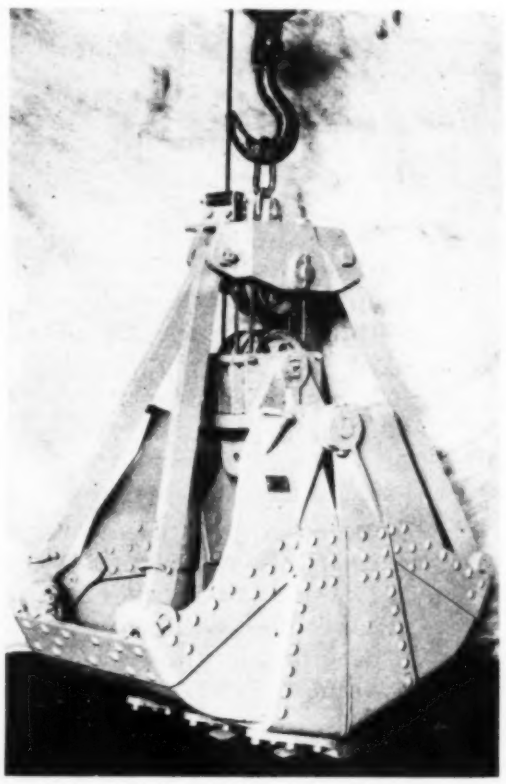
DOUBLE BUCKET CARRYING SCRAPER, cable controlled, has been designed to give increased yardage with D8 tractor power. Struck capacity, 17.7 cu.yd.; heaped capacity, 23 cu.yd. Double-bucket feature gives effect of loading two small Carryalls, one after other. Rear bucket telescopes forward and is loaded separately. After first bucket is loaded to capacity, it travels back on rollers and roller bearings instead of being forced back, thus reducing loading resistance and assuring largest possible loads for tractor effort. Second or front



section of bowl then is loaded. High sides of buckets retain material that would otherwise "boil" over and be lost by downhill or pusher loading. New apron design increases capacity, reduces overflow and facilitates loading by reducing entrance friction. Positive wipe-out ejection tailgate gives accurate control of spread, eliminating necessity for secondary spreading tools and emptying bowl completely and quickly of stickiest materials. Single dead-ended cable on either side of bowl pulls tailgate from vertical load center, thus reducing friction and wear on tailgate rollers and cable. Goose-neck or swan-neck yoke gives increased clearance for large single or dual tires when working over uneven ground. Tire sizes as follows: front either two 24x32's, two or four 18x24's; rear either two 24x32's or four 18x24's.—**R. G. Le Tourneau, Inc., Peoria, Ill.**

★ ★ ★

CLAMSHELL BUCKET of digging type, (Model K-6) designed for use in all kinds of excavation, is plain rope-reeved unit built with minimum number of parts in sizes from ⅜ to 2 cu.yd. and weights from 2,000 to 7,000 lb. Manganese steel closing sheaves,



supported by heavy plate steel frames, are of large diameter, with deep and flaring grooves, to reduce rope wear. Bushings are of bronze. Shell is formed of reinforced plates of open-hearth steel. Cutting edges are of high-carbon steel protected by tungsten alloy. Digging teeth are chrome-molybdenum forgings. Alemite lubrication is used with separate greaseways to each bearing.—**The Hayward Co., 50 Church St., New York, N. Y.**

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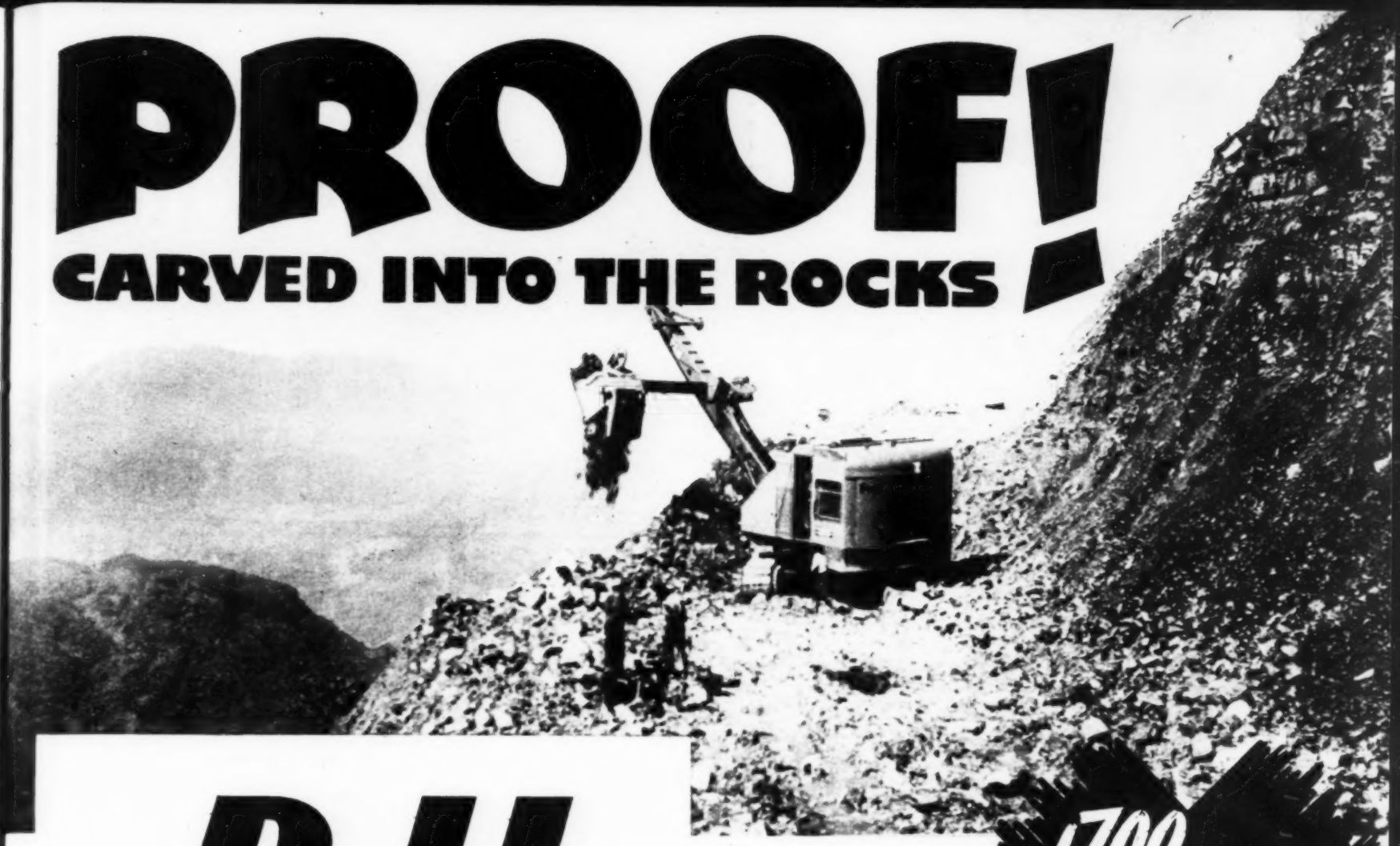

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YES, there's more muscle and less fat per pound of excavator in these P&H's than you'll find in any other machine. But why not? They're the *only* excavators with both upper and lower structures built *entirely* of *rolled steels,* all welded. They're tougher, faster, simpler in design, easier to operate.

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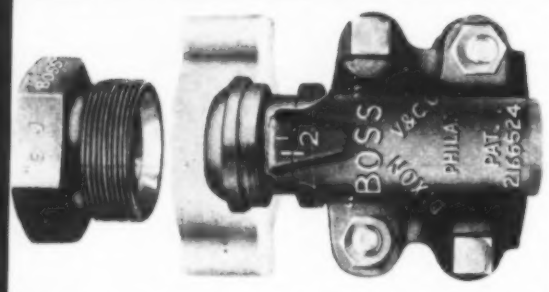

"GJ-BOSS"
HOSE COUPLINGS
GROUND JOINT TYPE, STYLE X-34

A washerless, leakproof coupling, correctly designed to insure unequalled efficiency and safety, plus protection to hose ends. Ground joint construction insures positive seal that will not leak, regardless of wear. Size ½" to 4", inclusive, with 4-Bolt "BOSS" Offset Interlocking Clamp on 1" and larger; 2-Bolt "Boss" Interlocking Clamp on ⅞" and smaller. Malleable Iron "COR-O-ZIG" stems on sizes 1¼" and larger; corrugated steel stems on sizes 1" and smaller. Cadmium plated — rustproof.

"BOSS" WASHER TYPE STYLE W-16
HOSE COUPLINGS

Same as above, except that head of stem and coupling end of spud are flat, to accommodate washer. Sizes ¼" to 4", inclusive, with same clamps and stems as "GJ-BOSS."

"BOSS" MALE COUPLING, STYLE MX-16

Stocked by Leading Rubber Manufacturers and Jobbers

DIXON
VALVE & COUPLING CO.

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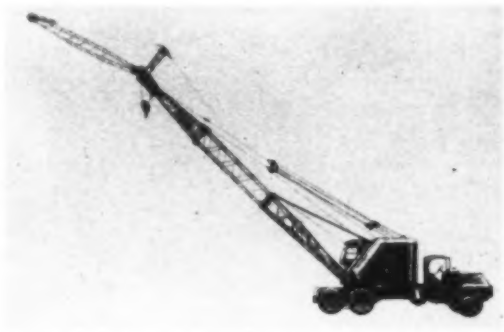
NON-TILTING, END DISCHARGE MIXER, 3½S, has 6-in. lower shoveling height said to cut as much as 5 mi. of shoveling in 5 days of work. Other features: (1) self-cleaning hopper which prevents aggregates or cement from sticking; (2) shimmy hopper control which makes stickiest material flow freely into drum; (3) die-formed, pressed steel drum heads and drum tracks; (4) chain belt drive. Mounted on two pneumatic-tired wheels. Equipped with 3½-hp. air-cooled motor and furnished with or without water tank, as desired.—**Chain Belt Co., 1600 W. Bruce St., Milwaukee, Wis.**

★ ★ ★

FLEXIBLE COUPLING for connecting diesel, oil, gasoline or gas engines to any type of machinery has been built to satisfy demand for coupling resilient enough to meet exact requirements of particular application. Said to decrease peak torque values when either prime mover or driven equipment has high fluctuating torque characteristic. Consists of resilient rubber gland lined with pre-molded, pre-vulcanized cylindrical section, especially treated to prevent air loss. Cylindrical lining is covered with multiple alternating layers of tough durable fabric and live rubber, and entire gland is permanently bonded to rugged steel inner and outer rims. Gland inflated to proper pressure through specially designed standard thread Schrader valve which will fit hand pump or air nozzle. Rubber covered metal cap prevents foreign material from entering valve. Made in six standard types (1) Both hubs external; (2) one hub inverted; (3) designed for equipment having flywheel on driving or driven shaft; (4) with thrust unit, intended for marine propulsion applications; (5) high-speed type; (6) disconnecting coupling for dual drives and other requirements.—**The Falk Corp., Milwaukee, Wis.**

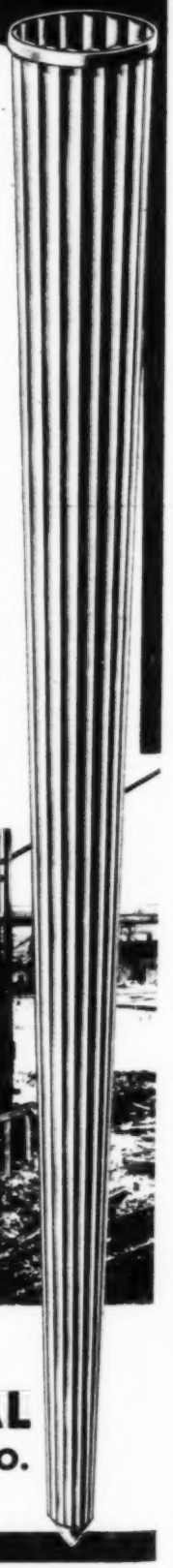
★ ★ ★

TRUCK CRANE has 80-ft. boom of all-welded, lattice-type construction which is not only light in weight, but also is said to possess such strength and stability that it can handle 30-ft. jib, thus providing boom length of 110 ft. This boom length, together with powered planetary lowering device



on main hoist line, is said to assure greater crane flexibility and constant control over movements of crane boom. Lowering device also said to be great safety factor, eliminating as it does accidental downward movement of boom. Mounted on P&H-Mack truck chassis. Equipped with hydraulic control for smooth responsive movements, full vision cab, low-type mounting, all-welded truck frame and special live roller circle.—**Harnischfeger Corp., 4515 National Avenue, Milwaukee, Wis.**

MONOTUBES' STRENGTH MADE A DOUBLE SAVING HERE



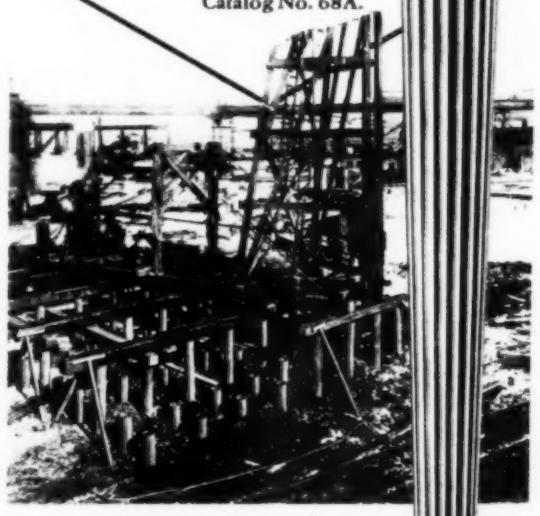
SAVING NO. 1

Instead of placing wood cribbing underneath the pile driver, the contractor used Monotubes for this purpose. The steel casings *were driven to a depth of 85 ft. in one piece,* after which short extensions were tack welded intermittently to the tops. Then cap timbers were placed across the extension and the driving rig moved into position. The Monotubes not only had the strength to sustain the load but offered sufficient rigidity without the aid of cross bracing. Over 600 piles were driven in this manner at a considerable saving to the contractor.

SAVING NO. 2

Monotubes saved valuable installation time because this same strength and rigidity permitted driving without core or mandrel—a most important factor today, when time limits are rigidly enforced.

For further information on Monotubes' many time and money-saving features, write for copy of Catalog No. 68A.



THE
UNION METAL
MANUFACTURING CO.
CANTON, OHIO

T. M. Wallen, Standard Oil Automotive Engineer (left), explains operation of test instruments to F. O. Griffin of the Brown Transfer and Storage Company, St. Joseph, Mo. Recommendations made as a result of tests brought the company a 12% increase in gasoline mileage on its fleet of Yellow Cabs and trucks.

TRUCK AND TAXI FLEET GETS 12% BETTER MILEAGE

Mr. O. D. Griffin really is from Missouri—from St. Joseph. He's Vice-President of the Brown Transfer and Storage Co. Mr. Griffin wanted to cut maintenance costs on trucks and taxicabs, so he called in a Standard Automotive Engineer and said, "Show me."

The Engineer went to work. From Brown maintenance men he got a complete "case history." A number of tests were run. Finally, carburetors were overhauled and new jets installed. Intake manifolds were cleaned and temperatures were checked to improve fuel vaporization. By the use of Standard Bus and Truck Oil, sludging in crankcase and valve chambers was eliminated.

The result was an increase of 1.2 miles per gallon of gasoline—an average of 12.5% for the fleet. Oil consumption and the maintenance of valves, pistons and rings were substantially reduced.

Experiences like this are of almost daily occurrence with Standard Oil Engineers. Why not let one start chopping away at your maintenance costs? No obligation of course.

CONTRACTOR'S OIL PROBLEM QUICKLY SOLVED BY ENGINEER

Clogged oil lines and filters, bearing failures, and high oil consumption were reasons enough for the Walter W. Magee Co. of St. Paul, Minnesota, to ask the assistance of a Standard Oil Engineer. A number of oils had been tried but always with the mentioned results.

The Engineer started looking for the real cause of the trouble. Operating conditions were severe. Temperatures were high—high enough to break down conventional oils. He recommended Standard Bus and Truck Oil, which has unusually high stability.

Results more than justified this higher quality oil . . . make-up oil was reduced 50%. In addition, the elimination of sludge gave further savings in reduced filter and bearing maintenance.

Put one of these Engineers to work on your problems. His service costs nothing and it may save you both time and money.

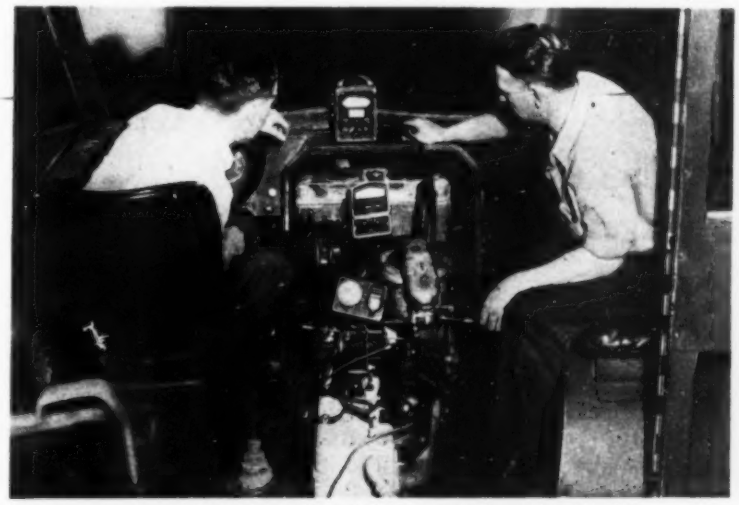
TRIPLES RING LIFE . . . ADDS ONE MILE PER GALLON . . . ON ALTON, ILL., BUS FLEET

"The steepest paved streets of any city in the country" are claimed by Alton, Illinois, located on the Mississippi River bluffs. The Citizens Coach Company, which operates there, naturally found maintenance and operating costs high. The equipment was doing a lot of running in second and low gear.

Four years ago, Supt. of Equipment V. J. Mans decided to see what he could do about it. He called in a Standard Oil Automotive Engineer. Since then the two of them have cooperated closely. A number of tests and adjustments have been made, with the Engineer's instruments.

The results to date show a gasoline mileage increase of from 4.5 to 5.5 miles per gallon—in spite of the hills. Rings were being replaced every 30,000 miles. Now, replacements are made at an 80,000 mile average and some as high as 160,000 miles.

Find out what these Engineers do and how they work. That won't cost anything. Then you can tell just where this service might help you.



Victor J. Mans, Supt. of Equipment (right), and Automotive Engineer W. L. McArthur in one of the Citizens Coach Company buses at Alton, Ill., with the Engineer's instruments set up for a road test. These tests, made under actual operating conditions, give an accurate measure of engine efficiency. All Standard Oil Automotive Engineers have portable instruments for making these tests.

HERE'S HOW YOU CAN GET THIS AUTOMOTIVE ENGINEERING SERVICE

If your garage is located in the Middle West, call one of the Standard Oil Co. (Indiana) offices listed below, or write 910 S. Michigan Avenue, Chicago, Illinois. Just tell where a Standard Oil Automotive Engineer can find you. You won't be obligated in any way. In Nebraska, write Standard Oil Company of Nebraska, at Omaha.

COLORADO
Denver
ILLINOIS
Chicago
Decatur
Joliet
Peoria
Quincy
INDIANA
Evansville
Indianapolis
South Bend

IOWA
Davenport
Des Moines
Mason City
KANSAS
Wichita
MICHIGAN
Detroit
Grand Rapids
Saginaw

MINNESOTA
Duluth
Mankato
Minneapolis
MISSOURI
Kansas City
St. Louis
St. Joseph
MONTANA
Billings

NORTH DAKOTA
Fargo
SOUTH DAKOTA
Huron
WISCONSIN
Green Bay
La Crosse
Milwaukee
WYOMING
Cheyenne

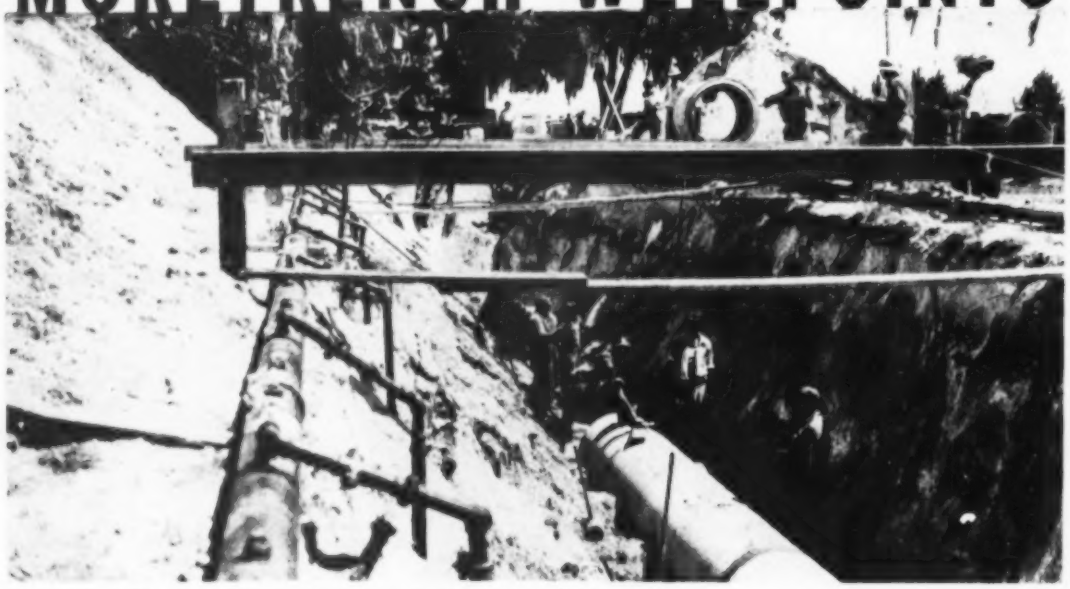
Copr. 1941, Standard Oil Company

STANDARD OIL COMPANY (INDIANA)

AUTOMOTIVE ENGINEERING SERVICE

LOWERS MILEAGE COSTS

MORETRENCH WELLPOINTS



1. Dry Unsheeted Trenches

2. Low Cost Excavation

3. A Fast Moving Job

COUNT on these from a MORETRENCH WELLPOINT SYSTEM. Hundreds of contractors do—time, time and again.

MORETRENCH CORPORATION

90 WEST ST., NEW YORK

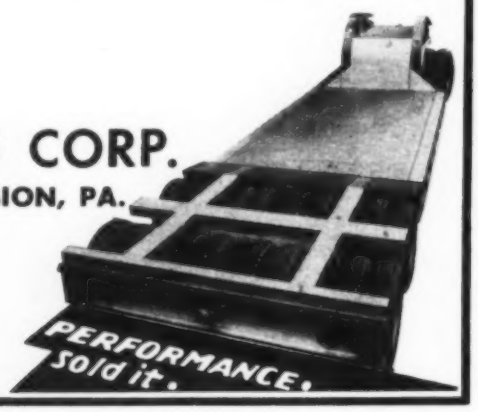
Rockaway, N. J. Joliet, Ill. New Orleans, La.

Haul 10 ft. **LOADS** *and*

Return Quickly

with 8 ft. **TRAILER**

ROGERS swinging side brackets permit you to haul the occasional extra wide load on a trailer that normally complies with legal limits as to width. Trailers with capacities as large as 60 tons are available so equipped.



ROGERS BROTHERS CORP.

220 ORCHARD STREET ALBION, PA.

ROGERS TRAILERS

PNEUMATIC-TIRED WAGON DRILL mounts 55- to 75-lb. hand rock drills and is said to increase drilling footage 50 to 80 per cent over hand operation; to be convenient to handle and to drill at any angle. Independent air motor operating feed gives wide range of pressures with ample power for pulling steels. Built in light, medium and heavy weight models with 4-, 6- and 10-ft. steel changes. —**Sullivan Machinery Co., Michigan City, Ind.**

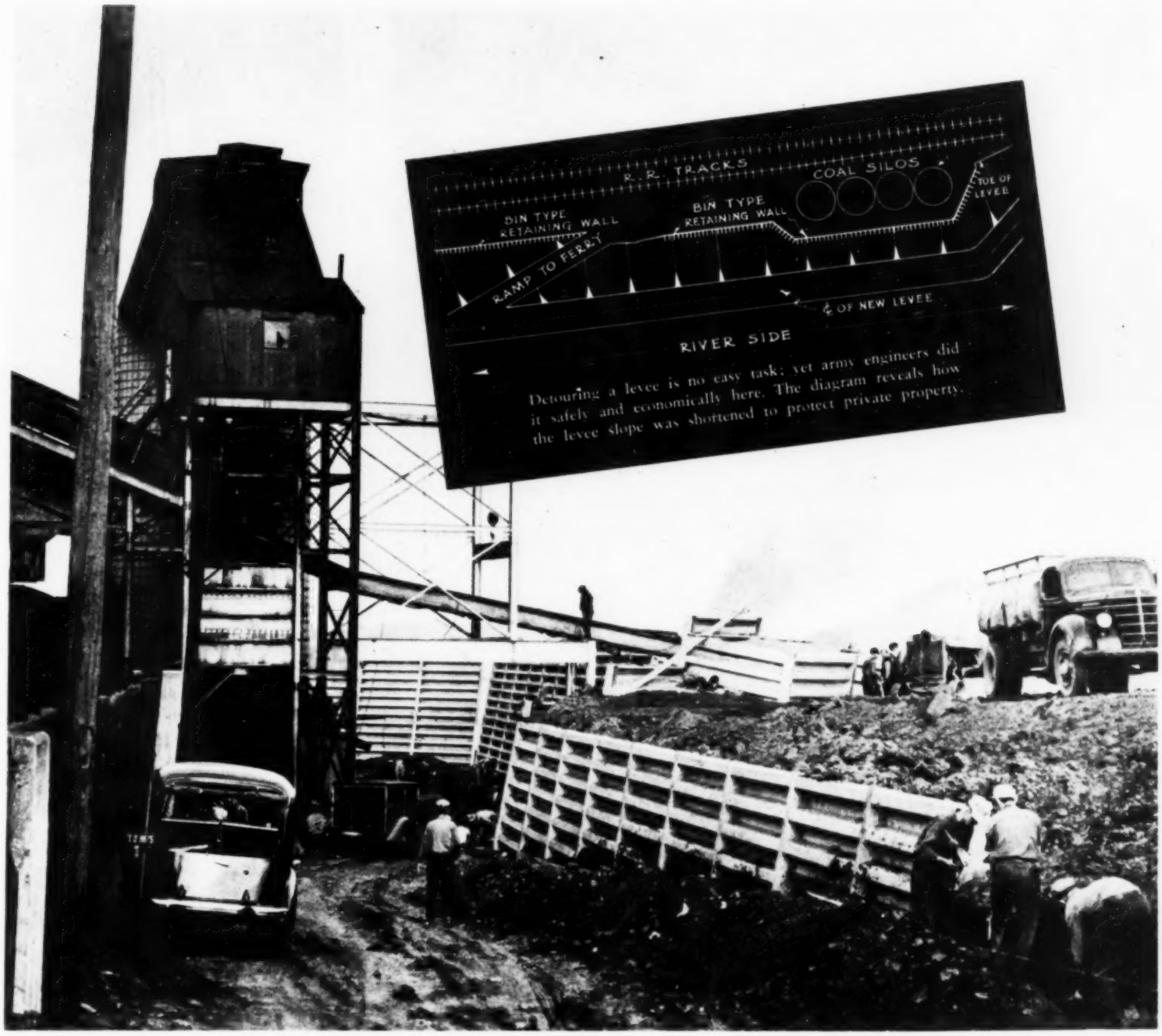
★ ★ ★

LIGHT SHADE CEMENT, called Verilite, is said to increase possiblities for economical use of architectural and safety construction concrete. May be used on commercial, industrial and institutional buildings for architectural concrete, such as marble, cast stone, floors, ramps, stairs, terrazzo and walls. Uses: art marble, cast-stone trims, driveways, floors, mortars, pools, porches, steps, stucco and walks. Also bridge heads, center lane markers, curbings, safety islands, "slow" traffic zones, traffic signal towers, warning zones and swimming pools. —**The Missouri Portland Cement Co., 3615 Olive St., St. Louis, Mo.**

★ ★ ★

INCLINED BOOM PAVER for delivering concrete into tall forms is built in 27-E and 34-E sizes with hand or power mechanism for tilting 30- or 35-ft. long boom to angle of 35 deg. with horizontal. Special roller attachment keeps bucket hanging vertically with boom set at incline. For running bucket up and

down boom on each model, a special drive mechanism is mounted well back of discharge end of paver so as not to interfere with angling of boom to right or left. Two types of bucket are available. One, for rapid discharge, is standard MultiFoote bucket with special bracket for mounting on rollers for vertical suspension from inclined boom. Other is of special Blaw-Knox design for positive control of concrete discharge from small dribble to full opening.—**Foote Co., Nunda, N. Y.**


R. R. TRACKS
COAL SILOS
TOE OF LEVEE
BIN TYPE RETAINING WALL
BIN TYPE RETAINING WALL
RAMP TO FERRY
℄ OF NEW LEVEE
RIVER SIDE
Detouring a levee is no easy task; yet army engineers did it safely and economically here. The diagram reveals how the levee slope was shortened to protect private property.

The Coal Yard That Didn't Disappear!

A new flood protection levee being built along the Ohio river threatened to engulf an adjacent coal yard. Fortunately army engineers had a ready answer.

Using an ARMCO Bin-Type Retaining Wall to shorten the slope, they carved a niche in the levee to accommodate the yard. This without sacrificing needed strength or stability. The flexible design of the ARMCO Wall was perfectly adapted to the relatively unequal bearing power of newly filled ground. Unskilled labor handled the job smoothly and the finished wall assures ample protection with little or no maintenance expense.

ARMCO Bin-Type Walls are an ideal solution for unstable slopes, right-of-way, stream erosion and similar problems. There is no danger of obsolescence. These sturdy walls are adaptable to curves and changes in elevation. Should conditions change, they can readily be extended or moved to a new site.

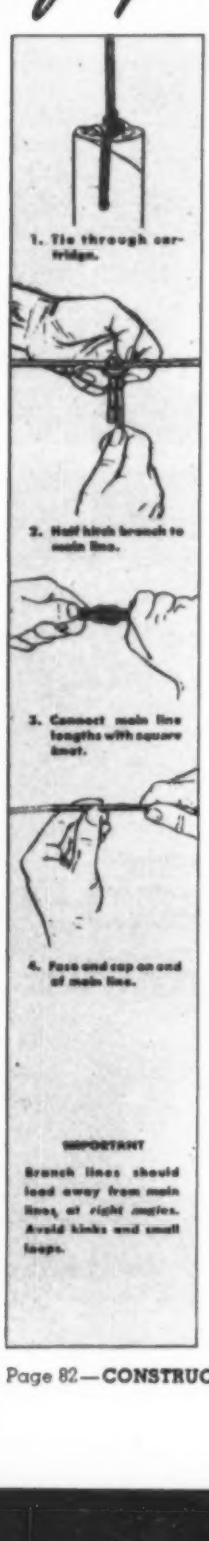
Use ARMCO Walls along highways, railroads, city streets or wherever embankments must be stabilized or confined. Write for information. ARMCO DRAINAGE PRODUCTS ASSN., 5036 Curtis Street, Middletown, Ohio.

ARMCO

Armco

BIN-TYPE RETAINING WALLS

Equipment moved LESS often


1. Tie through cartridge.
2. Half hitch branch to main line.
3. Connect main line lengths with square knot.
4. Fuse and cap on end of main line.
IMPORTANT
Branch lines should lead away from main lines, at right angles. Avoid kinks and small loops.

It *costs money* to remove track, pipe lines, shovels, and all the other equipment that must be out of the way when a blast *goes*. It *saves money* when you can do this *once* instead of two or more times.

How? By using Primacord to detonate and connect *more holes*. With Primacord - Bickford Detonating Fuse you can fire one hole or *a thousand* in one perfect blast. Fewer but bigger shots may hold some real economies for you. Write for the Primacord Book.

PRIMACORD BICKFORD Detonating Fuse

PB-34

THE ENSIGN-BICKFORD CO.
SIMSBURY, CONN.

Makers of Cordeau-Bickford Detonating Fuse—and Safety Fuse since 1836

PAVEMENT TESTER DRILL mounted on 2-wheel trailer which can be towed at speeds up to 35 m.p.h. Operates 7½-in.-diameter shot bit for obtaining test cores from concrete pavement. Powered by 4-cylinder Hercules gasoline engine having 2⅝x3-in. bore and stroke. Large tool compartment and built-in, 25-gal. water tank are added features.—**Ingersoll-Rand Co. Pillipsburg, N. J.**

★ ★ ★

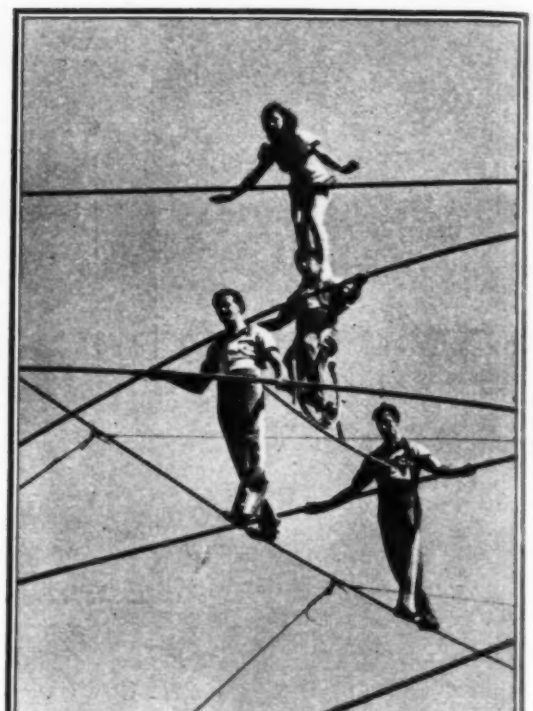
ROLLER-GATE CONCRETE BUCKET. knowrf as Hi-Lo charge model and available in 1-, 1½- and 2-cu.yd. sizes, will receive concrete charge either in upright position or lying down. Has receiving hood and skids which permit laying down of bucket to receive full rated load from truck mixer. When

raised, bucket assumes normal upright position for discharge. Also available are Hi-Lo attachments for converting standard roller gate concrete bucket, increasing bucket weights 240, 290 and 325 lb., respectively. Roller gate design said to permit easy and absolute control of low slump concrete and to be suited to handling of grout without leakage. **—Blaw-Knox Co., Pittsburgh, Pa.**

★ ★ ★

PIPE COUPLINGS for plain end pipe, available in sizes from ¾ to 4 in., consists of internal sleeve surrounding two pipe ends, against which at either end suitable gaskets are forced by pair of inter-

engaging body castings drawn together by bolts. Since covered sleeve arrangement offers greater resistance to corrosion and electrolysis, couplings may be used to advantage on underground pipe lines. May be had with special sleeves, gaskets and bolts to meet extraordinary conditions of service. **—Regor Products Co., 333 Kearney St., San Francisco, Calif.**



PERFECT BALANCE

The four tight rope walkers shown above, must have perfect balance to successfully perform their breath taking act. Just as their work depends upon this perfect balance so does the work of a shoveler depend upon balance in his shovel. Balance in a shovel means easier handling and more efficiency in shoveling. A new re-designed socket gives to the ABW Solid Shank Shovel a perfect balance. The new high bend has achieved for this famous shovel a balance unequalled in any other solid shank shovel.

New Redesigned Socket

Try This Test

Lay one of these new ABW Solid Shank Shovels on a table or desk, balance with the blade and socket projecting over the edge of the table, and the handle poised free of the table. Then tip the blade down to either side, release and watch the shovel right itself. This is the perfect balance which no other solid shank shovel has.

To users of shovels this is an important development and one that will be welcomed by buyers of shovels. In addition to this exclusive feature ABW Solid Shank Shovels are equipped with the famous Shock Band which gives more handle strength to the shovel. ABW Solid Shank Shovels are made from one solid bar of steel.

Ask your Jobber

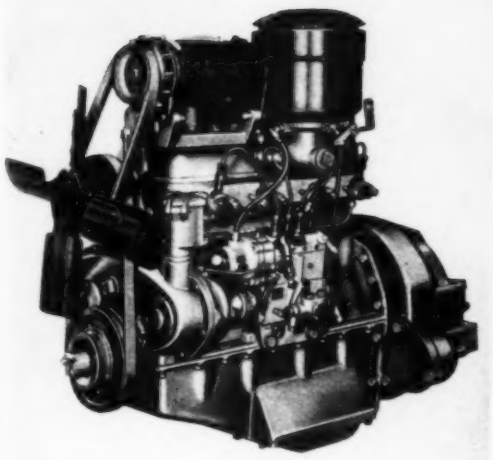
AMES Since 1774

ABW PRODUCTS

Shovels	Rakes
Spades	Post Hole Diggers
Scoops	Agricultural Handles
Forks	
Hoes	

AMES BALDWIN WYOMING CO.

PARKERSBURG, W. VA. • NORTH EASTON, MASS.



DIESEL ENGINE, fully engineered for Chevrolet trucks may be obtained to replace gasoline engines in both conventional and cab-over-engine types of 1½-ton chassis for 1940 and 1941. Although truck manufacturer does not offer diesel-powered Chevrolet trucks for domestic market, Hercules diesel replacement engines are supplied to Chevrolet dealers through various distributors or direct where no distributor set-up is in operation.—**Hercules Motors Corp., Canton, Ohio.**

★ ★ ★

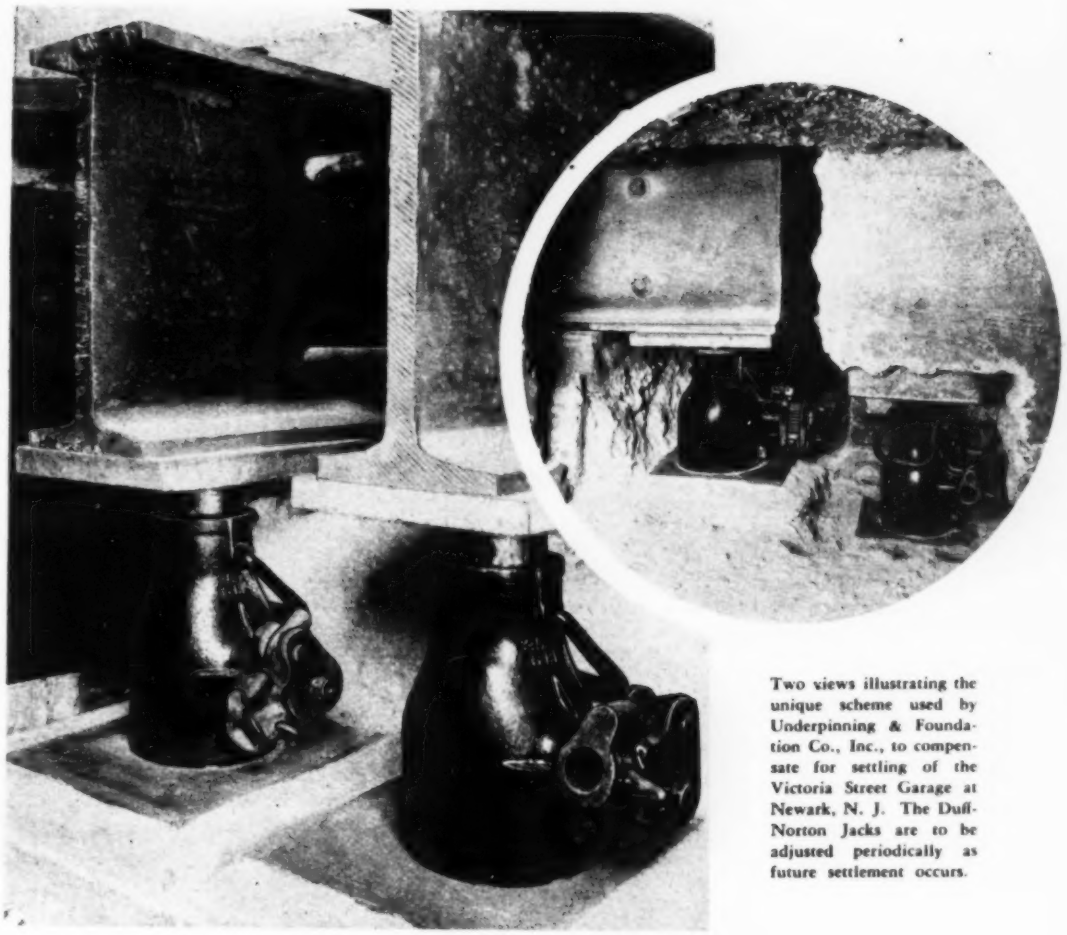
REVERSIBLE RATCHET WRENCH, midget pattern, has ¼-in. square drive, is 4½ in. long and incorporates same double-tooth pawl for both "on" and "off" rotation as is used in other Williams "Super-

ratchet" wrenches. Convenient shift lever at head instantly reverses wrench action. Handle is drop-forged from high tensile carbon steel; working parts are machined from chrome-molybdenum steel and heat-treated. Wrench is finished in chrome plate over nickel.—**J. H. Williams & Co., 225 Lafayette St., New York City.**

★ ★ ★

SMALLER INDUCTION MOTOR, a.c. squirrel cage, ball-bearing type, especially designed for general purpose industrial, machinery drive applications, are available in ratings from ½ to 5 hp., with speeds from 875 to 3,600 r.p.m. for operation on 110, 220, 440 and 550 v., 2- and 3-phase. Feature: "Permanently sealed" ball-bearing which requires lubrication once

every 3 yr. Double row bearing width said to give 50 per cent greater shaft contact area with consequent longer bearing life and reduced shaft wear. Other features: (1) Specially developed wire coating to give maximum dielectric strength, toughness and flexibility; (2) reinforced cuffs at slot edges protect windings from abrasion and coil ends are taped to brace them against strains of full voltage starting; (3) rigid one-piece cast frame assures stiff support for rotor; (4) buffed edstings.—**Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.**



Two views illustrating the unique scheme used by Underpinning & Foundation Co., Inc., to compensate for settling of the Victoria Street Garage at Newark, N. J. The Duff-Norton Jacks are to be adjusted periodically as future settlement occurs.

DUFF-NORTON JACKS offset SETTLING

DUFF-NORTON CONSTRUCTION JACKS

Ball Bearing Screw Jack for extra heavy duty. Sizes 15 to 100 tons.
This "Jack of All Trades" combines straight lifting, with chain, hook, and foot-lifting.
Other Duff-Norton Jacks include Trench Braces, Push and Pull Jacks, Pipe Forcing Jacks.

Almost 100 Duff-Norton Jacks have been installed by Underpinning & Foundation Co., Inc., of New York City to take up any future settlement that may occur in the city-owned garage at Victoria Street, Newark, N. J. The columns, wall girders, etc., have already been raised by means of the Duff-Norton Jacks, and further settlement will be compensated for by periodic jacking.

Construction engineers everywhere rely on Duff-Norton Jacks for dependability, easy action, long life. Made by the world's oldest and largest manufacturer of lifting jacks, Duff-Norton Jacks can be safely trusted to handle your heaviest loads. Let your Jobber show you the many types and sizes made specially for engineering and building construction service.

THE DUFF-NORTON MANUFACTURING CO.
PITTSBURGH, PA.
CANADIAN PLANT COATICOOK, QUEBEC
"The House That Jacks Built"

UNIVERSAL
Spirolocs

Pat. No. 1,925,689

FOR ALL TYPES OF CONCRETE CONSTRUCTION

Furnished with either Handle Washers or Nut Washers

Spirolocs showing Handle Washers, Stud Rods and a Threaded Tie Rod

(Each Assembly consists of Two Washers and Two Stud Rods)

The Assembly

Features:

1. Easily inserted through holes drilled in the sheathing of the wall forms.
2. Wide Range of Adjustment to accommodate any dimensions of form lumber without removing the washers.
3. Keeps the tie rods the required distance back from the wall face.
4. Permits removal of the tie rod when required.
5. Leaves a small hole to be grouted.

The Spiroloc Washer Combination

The Combination of an Assembly using one Nut Washer and one Handle Washer:

1. Allows complete installation of the assembly, except handle washer from one side of the forms.
2. Nut Washer acts as a stop to prevent the assembly from passing through the forms.
3. Handle Washer is slipped over the Stud Rod on the other side of the forms, seated against the wale and tightened with one complete turn.

Spirolocs showing Nut Washers, Stud Rods, Cone Nuts and threaded tie rod

These assemblies may be rented with an option to purchase

"Universal Products for Concrete Construction"

●

Manufactured by

UNIVERSAL FORM CLAMP CO.

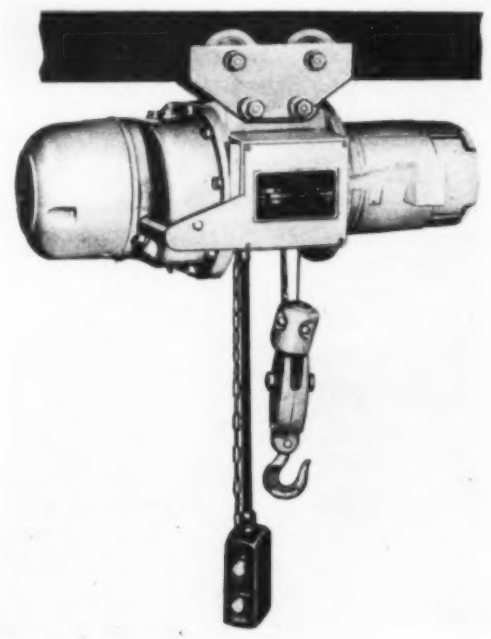
General Offices:

961-65 Montana St. Chicago, Ill.

Branches:

New York Cleveland Houston Atlanta

AIR-COOLED ELECTRIC HOIST. low-cost, wire-rope unit, is named "Load King" and is available in two capacities, ¼ and ½ tons, and in three types, lug, hook or plain trolley, with choice either of right angle or parallel suspension. Besides air-cooling

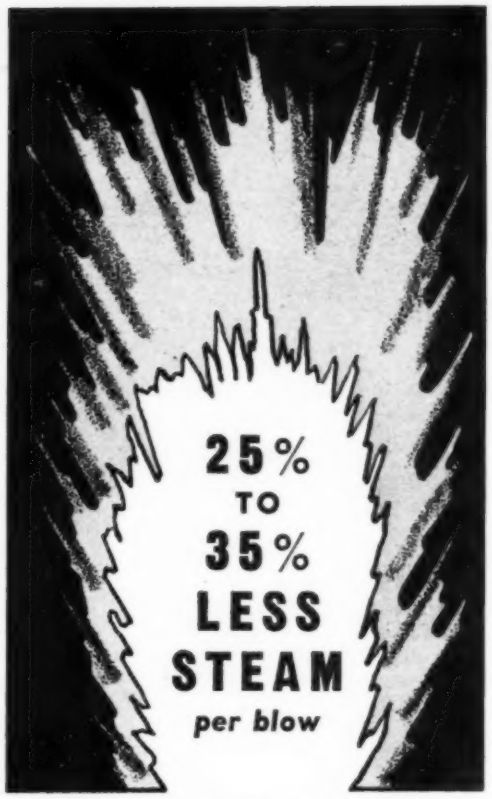


feature which is said to eliminate excess brake heat and to permit heavier-duty cycles, makers claim other advantages: Ruggedness and strength; simplicity of design, operation and maintenance; standard interchangeability of repair parts, small, overall dimensions, maximum use of ball or roller bearings, and high overall efficiency. May be operated out of doors as well as under all normal plant conditions.—**Yale & Towne Mfg. Co., Philadelphia, Pa.**

★ ★ ★

TRUCK-MOUNTED HIGHWAY WIDENING MACHINE for cutting trenches for use with or without forms, for cutting curb trenches, for cleaning small roadside drainage ditches and for excavating inner side of road curves in straightening operations, may be had in two models, one digging trenches 12 to 33 in. wide and other digging trenches 12 to 48 in. wide. Digging wheel assembly may be swung in back of machine, conforming to transportation regulations in states. Arriving on job, digging wheel assembly is swung back into digging position by

rotating about rear upright and by connecting drive by threading heavy-duty roller chain over drive sprockets. Midship transmission is mounted back of truck transmission, providing reduction for excavator drive take-off, selection of four reductions for digging traction drive and direct drive for road speeds. Excavator wheel drive is taken from this midship transmission. Twin-disk friction safety clutch guards against overloads. Digging wheel assembly bolts to guide shoes sliding on tubular uprights and is raised and lowered by steel wire cables operated through worm and gear unit in oil tight case. When machine is digging, supporting cables are adjusted so that rear end of excavating mechanism rests on shoe or leveler securely bolted to excavator frame and provided with runner which rides bottom of excavation. Model 16-R-2 is mounted on 1½-ton Chevrolet; Model 16-R-4 may be mounted on any new or used truck in good mechanical condition and having rated capacity of 3 tons or more and wheelbase of 168 in., or more.—**Buckeye Traction Ditcher Co., Findlay, Ohio**



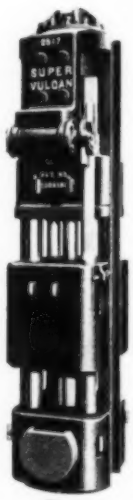
YOU SAVE MONEY MANY WAYS with

SUPER-VULCAN OPEN-TYPE

DIFFERENTIAL-ACTING

PILE HAMMERS

18C, 30C, 50C, and 80C



Less steam means less costs . . . in getting twice the number of blows per minute you save time and therefore money—the dependable performance contributes to savings—the longer service ability means more maintenance money saved . . . plus all this you get easier operation. The Super-Vulcan Open-Type fits the same leads—and uses the same accessories as the Vulcan Single-Acting Pile Hammers. Write and get all the important facts.

Sizes 18C—30C—50C—80C meet all needs

●

VULCAN IRON WORKS Since 1852

331 North Bell Avenue

Chicago ILLINOIS

Lowest Prices

in the Biggest-Selling TRUCK FIELD!

FEATURES

★ TWO NEW VALVE-IN-HEAD ENGINES . . . STANDARD: 174 FOOT-POUNDS OF TORQUE—90 HORSEPOWER . . . "LOAD-MASTER": 192 FOOT-POUNDS OF TORQUE—93 HORSEPOWER* ★ NEW RECIRCULATING BALL-BEARING STEERING GEAR ★ NEW, MORE COMFORTABLE DRIVER'S COMPARTMENT

*Optional on Heavy Duty models at extra cost

60 MODELS

ON NINE LONGER WHEELBASES . . .
A COMPLETE LINE FOR ALL LINES OF BUSINESS

Chevrolet trucks are selling now at the lowest prices of any in the biggest-selling low-price field. . . . That's *one* vital reason why America prefers them.

And Chevrolet trucks are "tops" to meet today's great need for units that make "*Deliveries P.D.Q.*"—powerfully, dependably, quickly. . . . That is another, and an even more important, reason why America prefers them.

You want to make "*Deliveries P.D.Q.*"—and to make them at the lowest cost in truck operation and upkeep. In short, you want Chevrolet trucks.

Ask your Chevrolet dealer about today's low prices—*today*.

CHEVROLET MOTOR DIVISION, *General Motors Sales Corporation*, DETROIT, MICHIGAN

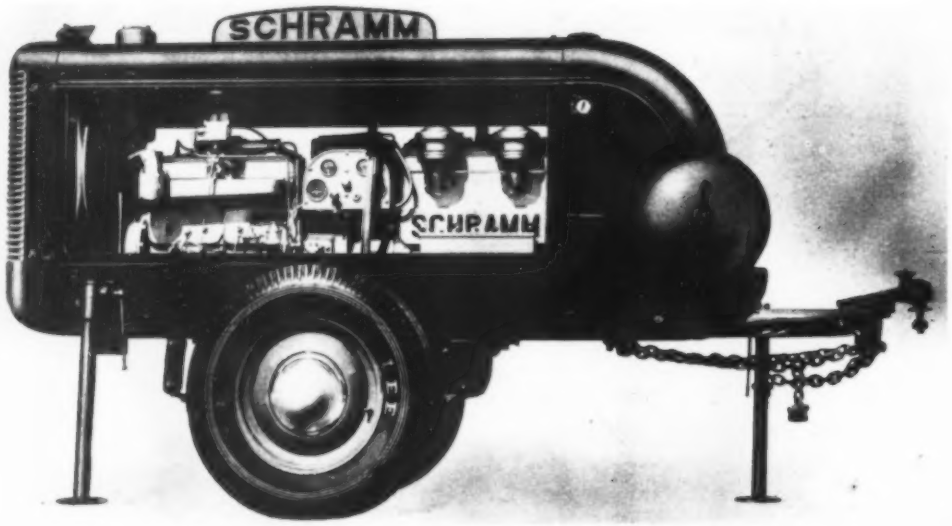
CHEVROLET TRUCKS

"THRIFT-CARRIERS FOR THE NATION"

SCHRAMM

the perfect combination for

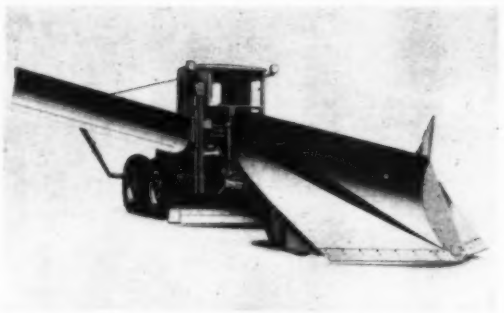
CONSTRUCTION WORK



SCHRAMM STANDARD 105 CUBIC FOOT AIR COMPRESSOR

SCHRAMM, INC.

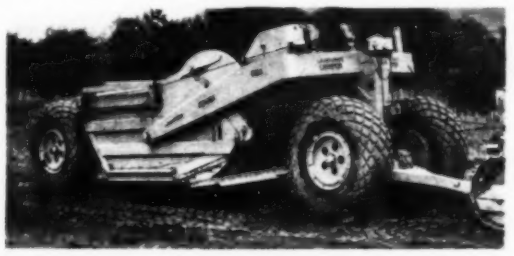
WEST CHESTER, PA.



SNOW PLOW for use with all models of Caterpillar motor graders features special alloy steel in moldboards to give greater strength in proportion to weight. Also featured are extensive welded reinforcements and crank-type lifts, giving down pressure on plows. Mast-type snow wings and reversible one-way plows for motor graders also available—**Caterpillar Tractor Co., Peoria, Ill.**

★ ★ ★

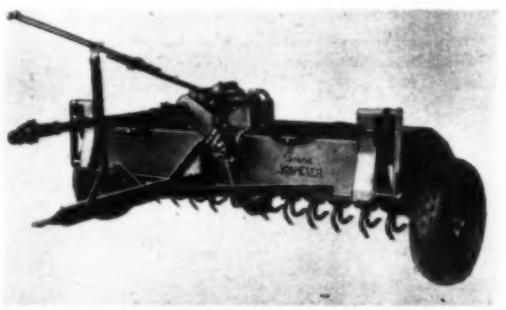
OFF-THE-ROAD TIRES for use in rugged service of construction and earth-moving jobs are now available in four new models: (1) Earth Mover All-Weather tread; (2) Low-Pressure Sure-Grip grader; (3) Hard Rock Lug and (4) ML Logger tire. Earth Mover, with thick tread and large non-skid buttons, is said to make it possible for contractors to handle not only sand and soft earth, but also shale and



solid rock blastings with self-loading scrapers. Available in 14.00x20-, 16.00x20-, 18.00x24-, 21.00x24- and 24.00x32-in. sizes. Low-Pressure Sure-Grip grader tire has disconnected bar-type tread that delivers extra 50 per cent traction with no decrease in rolling ability and greatly improves tire's traction in reverse. Hard Rock Lug tire has flatter tread with bars 50 per cent wider than those on former tires and is recommended for rock excavation, strip mines and other operations where cutting hazards are great. Continuous rib around new ML Logger's tread is said to provide smoother operation and to increase ability to give longer mileage on hard-surfaced roads.—**The Goodyear Tire & Rubber Co., Akron, Ohio.**

★ ★ ★

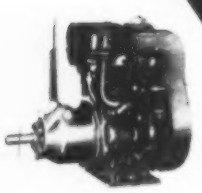
AGGREGATE MIXER, known as "Aggmixer," for use in highway stabilization and mixed-in-place construction, is said to dry mix thoroughly whatever type of aggregate is used, to reduce moisture content and to pulverize and mix aggregate with binder. Also mixes aggregate without displacing material on road surface. Used in conjunction with other road equipment and operates from power



take-off shaft of any suitable tractor, wheeled or track type. New feature: Rubber-mounted tines which forcibly throw mixture against inside of inclosure hood, completely pulverizing and mixing it, as tines revolve. Accurate and positive depth adjustment is provided by stops on each side of Aggmixer that are set to required depth before beginning operation. All controls arranged so that tractor operator does not have to leave cab to handle. Unit has hydraulic lift and individual hydraulic rams for lift and adjustment of each wheel. Total lift on each wheel, 15 in., making it possible to work on shoulders, curbs and uneven surfaces. —**Ariens Co., Brillion, Wis.**

No Weather Grief

Wisconsin-powered Street Sweeper in winter service.



A full range of sizes: 1 to 35 HP.

Extremes of heat or cold; snow, rain; high or low humidity...make very little difference to Wisconsin HEAVY-DUTY air-cooled engines. They *start* and *run* with uniform ease and dependability, regardless of weather conditions. Maybe this DOES make a difference to you . . . Be Wisconsin-equipped for dependable power service... any time, anywhere, any job. Write: Dept. E-7.

MOST POWER PER POUND — HEAVY-DUTY AIR-COOLED ENGINES

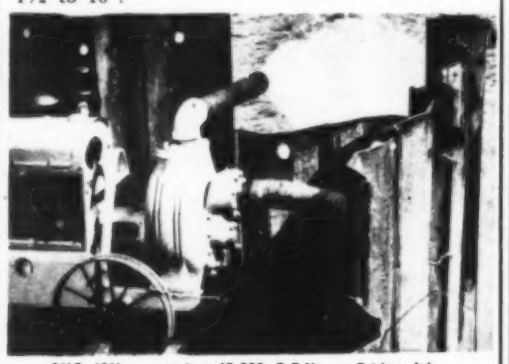
by WISCONSIN MOTOR CORPORATION
Milwaukee, Wisconsin, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

DUAL PRIME CENTRIFUGAL PUMPS

UNMATCHED IN PRIMING SPEED!

Own CMC's famous Twin Primers. They save time—save money. For big jobs or small—you can get good deliveries on all sizes from 1½ to 10".



CMC 40M — pumping 40,000 G.P.H. on Bridge Job.

Anticipate your equipment needs. Get CMC's big new catalog of Concrete Mixers, Batching Equipment, Hoe Type Mixers, Pumps, Hoists, Power Saws, Carts, Barrows.

CONSTRUCTION MACHINERY CO.

WATERLOO, IOWA

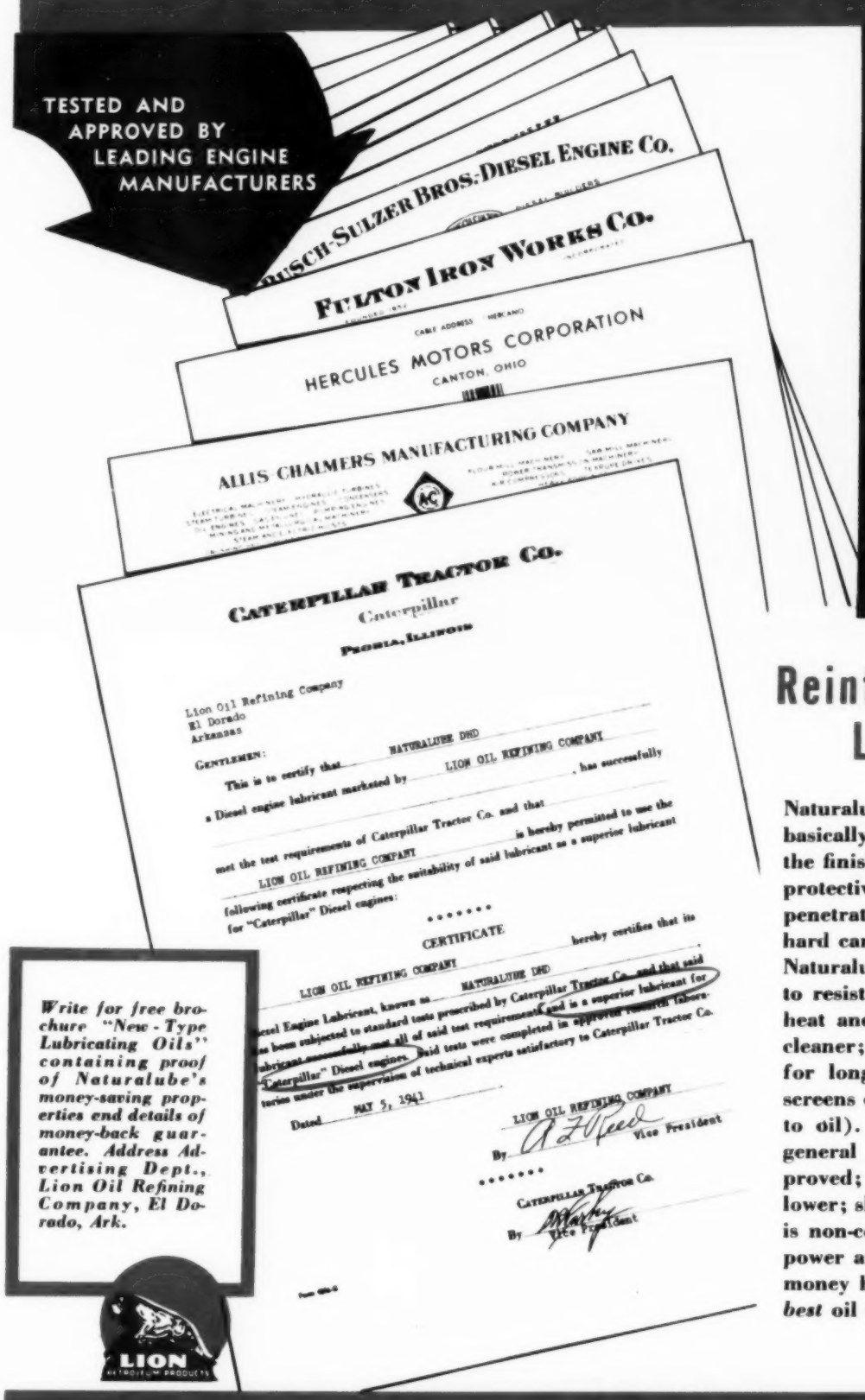
LION Naturalube

FOR DIESEL AND HEAVY DUTY

D.H.D. OIL

NEW IMPROVED SUPER-LUBRICANT

TESTED AND APPROVED BY LEADING ENGINE MANUFACTURERS


Sulzer Bros. Diesel Engine Co.
Fulton Iron Works Co.
Hercules Motors Corporation
Canton, Ohio
Allis Chalmers Manufacturing Company
Caterpillar Tractor Co.
Caterpillar
Peoria, Illinois
Lion Oil Refining Company
El Dorado
Arkansas
Gentlemen:
This is to certify that NATURALUBE DHD
a Diesel engine lubricant marketed by LION OIL REFINING COMPANY, has successfully
met the test requirements of Caterpillar Tractor Co. and that
LION OIL REFINING COMPANY is hereby permitted to use the
following certificate respecting the suitability of said lubricant as a superior lubricant
for "Caterpillar" Diesel engines:
CERTIFICATE
LION OIL REFINING COMPANY hereby certifies that its
Diesel Engine Lubricant, known as NATURALUBE DHD
has been subjected to standard tests prescribed by Caterpillar Tractor Co. and that said
lubricant successfully met all of said test requirements and is a superior lubricant for
"Caterpillar" Diesel engines. Said tests were completed in approved manner Tabora-
tories under the supervision of technical experts satisfactory to Caterpillar Tractor Co.
Dated MAY 5, 1941
LION OIL REFINING COMPANY
By A. L. Reed Vice President
Caterpillar Tractor Co.
By Vice President

BASICALLY DIFFERENT!
SPECIALLY PROCESSED!
REINFORCED!

- 3 to 10 Times Stronger Protective Film
- Removes Hard Carbon
- More Adhesive and Penetrative
- Non-Corrosive—Safe
- Keeps Piston Rings Free
- Adds Power, Saves Fuel, Saves Wear and Shut-Down Time

Reinforced for Toughest Lubrication Jobs

Naturalube D. H. D. is made from a rare and basically different crude oil which imparts to the finished product a 3 to 10 times stronger protective film . . . greater adhesiveness and penetrativeness . . . and ability to remove hard carbon deposits. By special processing, Naturalube D. H. D. is reinforced or fortified to resist the deteriorating effects of extreme heat and oxidation. Results — engines are cleaner; rings and valves operate more freely for longer periods; no clogging of filters, screens or oil lines (i.e. clogging attributable to oil). There is no hard-carbon scuffing; general engine performance is greatly improved; operating and maintenance costs are lower; shut-down time is minimized. D. H. D. is non-corrosive — safe. It saves wear, adds power and saves fuel. Try D. H. D. — Your money back if you don't believe it to be the *best* oil you ever used!

Write for free brochure "New-Type Lubricating Oils" containing proof of Naturalube's money-saving properties and details of money-back guarantee. Address Advertising Dept., Lion Oil Refining Company, El Dorado, Ark.

LION PETROLEUM PRODUCTS

Made by **LION OIL REFINING COMPANY, El Dorado, Arkansas**

FOR LONG LOW-COST EQUIPMENT LIFE . . .

BUY THE SCRAPER WITH A BACKBONE

a LeTOURNEAU CARRYALL

To take the beatings of your toughest jobs, LeTourneau Carryall Scrapers are built like a box. Sides and ends are stoutly welded together by rugged overhead "A" frame (1), spring pipe (2) and bracing (3). This additional overhead support eliminates the inherent weakness of the ordinary open-body type scraper . . . gives you a rigid construction that handles big loads of the toughest materials without undue body strains, twisting, distortion or buckling. It's a money-saving construction feature that gives you *lowest-net-cost-per-yard*.

CHECK THESE OTHER MONEY-SAVING FEATURES	LeTOURNEAU CARRYALL	Any Other Make
Can tailgate and apron be separately controlled? Can apron be raised or lowered without moving tailgate?	YES	
Is it possible to use large or dual tires for soft work? Is scraper axle designed to allow use of various tire sizes?	YES	
When unloading can operator control depth of spread? Is ejection a positive force system?	YES	
Will it pick up heaping loads in all types of materials? Is it designed to buck rock and shale without buckling?	YES	
Is scraper cable controlled by a proven power unit? Has the power unit been proven by years of actual job use?	YES by over 16,500 LeTourneau Power Units	
Are cables located so they will not wear in dirt? Has scraper been designed to protect cables from wear?	YES	
Has scraper been proven by actual job performance? Was it built by earthmoving men who know job conditions?	YES—Over 8,000 other Carryalls now in use	
Is there a wide range of models to fit all size jobs?	YES—13 sizes from 3.5 to 42 heaped yards	
Will the scraper have a high trade-in or resale value? In future years will there be a market for your scraper?	YES—1st Carryall built still in use on West Coast	
Can you get parts and service any time . . . anywhere? Is the scraper backed by a well-trained organization?	YES—in over 100 U.S. cities and 110 foreign countries	

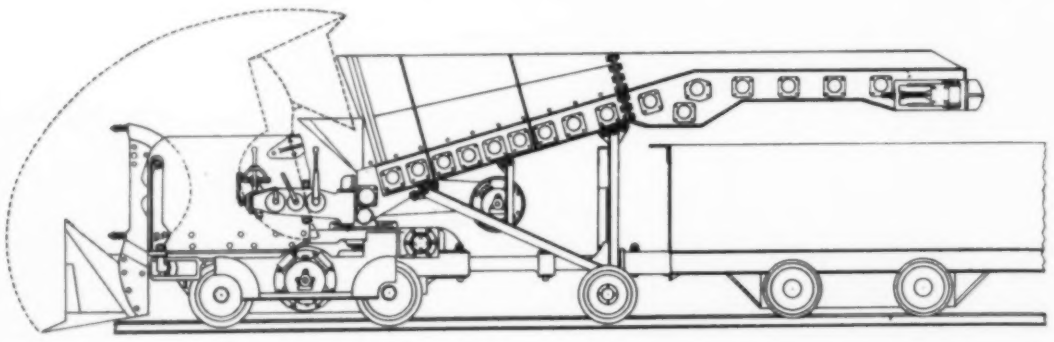
Compare LeTourneau Carryalls "the Scraper with a backbone"—point by point with any other scraper on the market. Then ask your LeTourneau - "Caterpillar" dealer to get your order in early!

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

Cable Address: "BOBLETORNO"

NEW MUCKING MACHINE. "Tunneloader" is claimed by its makers to be not only larger and more powerful than other models, but also to present several new features which permit loading with speed and economy largest cars used underground. Two improvements have been made in mucking action: (1) Separately powered self-locking worm-and-gear mechanism for swinging bucket assembly to any desired digging position without manual effort by operator; (2) elimination of need for centering bucket assembly before dumping by providing hopper into which bucket discharges direct instead of



into cars which require lining up. Use of hopper, which feeds on to short separately powered belt conveyor permits loading of cars up to 15 ft. long and 6 ft. high. Uniform loading assured by use of long coupling-bar which slides in sleeve cored throughout length of loader frame and provided with spacing holes for coupling pin so that position of car with respect to loader can be varied, as desired. Outstanding feature: Moderate weight (12,000 lb.) in comparison with high loading capacity of more than 3 tons per minute. Other operating advantages claimed: (1) Sectionalized construction which permits traveling around sharp curves; (2) easy disassembling for transportation or caging; (3) Moderate head-room requirements; (4) low cost for operation and maintenance. Four motors (tramming, bucket-elevating, bucket-swing and conveyor) may be either radial compressed-air type or electric. Specifications, subject to variation; length, 23 ft. 9 in.; height, 6 ft. 8 in.; headroom, 7 ft. 6 in. to 7 ft. 10 in.; digging width, 11 ft.; bucket capacity, 9 to 12 cu.ft.; loading capacity, 50 to 75 cu.ft. per minute; range of track gage, 30 to 56½ in.—**The Eimco Corp., 634-666 South 4th West St., Salt Lake City, Utah.**

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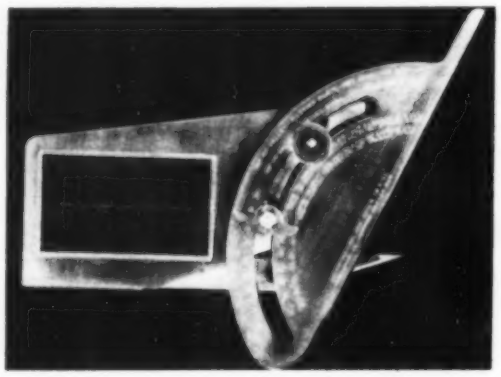
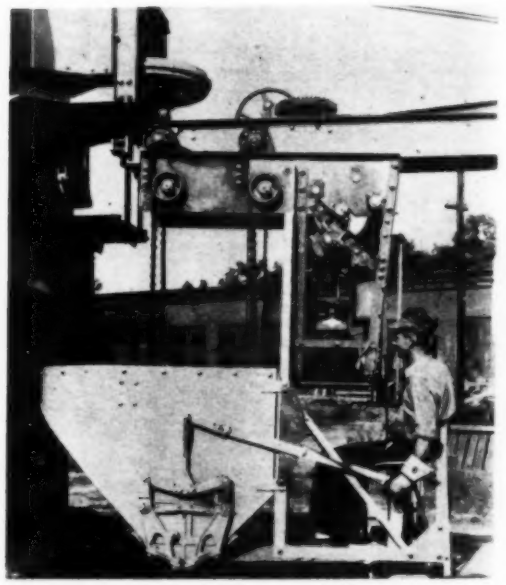


PORTABLE ROOF FRAMING PROTRACTOR. designed for use with Models 77 or 87 Skilsaws, eliminates hand marking of rafters with steel square. Makes rafter cuts on 2x4-, 2x6- or 2x8-in. lumber for roofs having 6-, 8-, 12-, 15-, 18-, 21-, or 24-in. rise per foot of run, provided joining planes have same pitch. Bridging, bracing, straight cutoffs and fire cuts also can be made. Protractor calibrated in inches rise per foot of common rafter run has four scales, one pair for common and jack rafters and other for hip and valley rafters. Rafter length table is mounted on protractor for calculating rafter lengths. Cutting may be done on rafter pile or on horses.—**Skilsaw, Inc. 5033 Elston Ave., Chicago, Ill.**

★ ★ ★

NEW WAGON DRILL. designated by number G-500, is designed to put down large-diameter holes in rock to depths of 40 ft., using 4-in. drifter. Wheel-mounted rig has sturdy tubular steel base which permits conversion to skid mounting. Drill steel is fed down by gravity and raised by air or hand hoist. For angle drilling hand crank tilts tower for quick adjustment through angle of 25 deg. either side of vertical; there is also a lateral adjustment of 7½ deg. either side of vertical. Locking device holds tower in position. Rear wheels can be turned at right angles (tandem) for line drilling or broaching. Machine regularly equipped for 10-ft. steel changes. Weights of wagons range from 2,350 to 2,690 lb.—**Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.**



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POWER-DRIVEN BUCKET on standard 27-E paving mixer was designed for pouring concrete revetment mat for Mississippi River bank protection. Bucket is mounted on frame suspended from boom on bucket rollers. Frame includes operator's platform, small engine for power and drive mechanism. Operator rides with bucket and can raise or lower it from 12 to 50 in. above ground level or run it back and forth on boom by power. Opening and closing of bucket doors is by manual control of bucket operator. This equipment makes it possible for operator to ride bucket load of concrete out on boom, spot it and discharge concrete at desired point. Boom can be swung at 90-deg. angle and at this position, bucket at farthest point out on boom is 28 ft. from edge of paver.—**Foote Co., Nunda, N. Y.**

FLEET OF FOUR — Griffin-MacDougald Construction Co., cuts loading, hauling and spreading time and costs with 4 "Caterpillar"-powered C Tournapulls and LS Carryalls (11 heaped yards) at Chamblee, Ga.

On Long Hauls

LOWER ALL 3 COSTS with TOURNAPULLS

One Tractor Easily Pusher Loads Tournapull Fleet
..No Spreading Tools Needed
..You Save on Compaction, Too

To get the lowest net cost per yard on long hauls, analyze your complete earthmoving cycle, including loading, hauling and spreading figures. Tournapulls can save you money on all three. Here's how:

Double Power Loading

Tournapull weight is centered where it's needed—on the drive wheels—to give you greater tractive power. This extra tractive power, coupled with a pusher, enables you to get larger loads quicker. Result: one pusher easily handles 3 to 4 Tournapulls, depending on length of haul . . . and your low initial investment in a flexible, multiple-purpose pusher tractor is spread over 30 to 50 loads hourly! Compare the cost with truck loading methods.

High Average Speeds

Because Tournapulls have plenty of surplus rimpull, plus proper gear ratios, to accelerate to top speed quickly and to pull through tough spots without delays, you get high average speeds—move more big loads hourly. Check Tournapull speed and yardage on the job with other self-propelled rigs.

Spreads Own Loads

Tournapulls spread their own loads on the move, require no investment in spreading tools, add substantially to compaction, too.

Alert contractors the country over, comparing costs per yard of loading, hauling and spreading, have adopted Tournapulls for long haul jobs. Try them on your job—see for yourself how they lower earthmoving costs.

Ask your LeTourneau-"Caterpillar" dealer to put your order in NOW.

These Profit-Making Yardages Can be Yours with . . .

TOURNAPULLS

Loading common earth on the level with a "Caterpillar" D8 pusher and hauling over good roadways, you can expect the following yardages in a 60-minute hour from Tournapulls:

Haul—One Way	Model C (11 yards heaped)		Super C (15 yards heaped)	
	Trips	Pay Yards	Trips	Pay Yards
1200	13.3	113	12.0	144
1600	11.8	100	10.7	129
2000	10.5	89	9.7	116
3000	8.1	69	7.6	91
5000	5.7	49	5.4	65

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

For Lowest Net Cost per Yard—CARRYALL* SCRAPERS, ANGLEDOZERS*, POWER CONTROL UNITS, BULLDOZERS, RIPPERS*, TRACTOR CRANES, PUSHDOZERS, TOURNAPULLS*, SHEEP'S FOOT ROLLERS, TOURNATRAILERS*, TOURNACRANE.

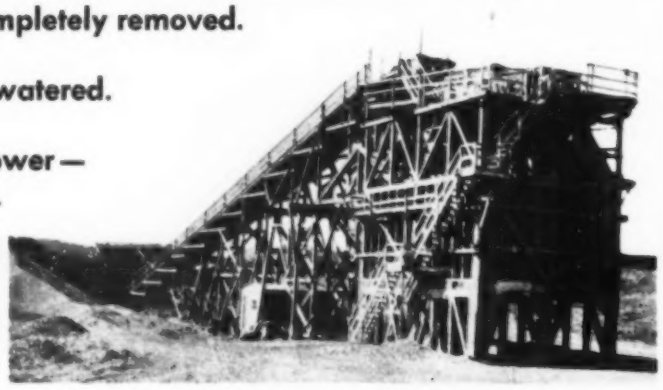
*Name Reg. U. S. Pat. Off.

3 Reasons why You're ahead with

Reliance

SAND and GRAVEL Washing and Handling Units

1. Foreign substances completely removed.
2. Sand thoroughly de-watered.
3. Saves head room, power—simplifies distribution.



The best results in cleaning sand and gravel are obtained through the use of Reliance System Revolving Screens and Paddle Type Boxes. Clay, loom and other foreign matter is completely removed and floated away. The sand is de-watered while being carried to the storage bin. The single sizing screen saves head room and power and simplifies distribution to storage. Send for Catalog No. 11.

UNIVERSAL ROAD MACHINERY CO.
KINGSTON, N. Y., U. S. A.

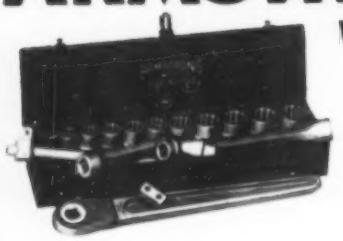
Distributors in ALL principle cities of the U. S. A.

RELIANCE PRODUCTS

Reliance offers a complete line of Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverizers; Chip Spreaders; Heating Kettles; Bin Gates; Feeders; Belt Conveyors; Grizzlies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.

ARMSTRONG

WRENCHES
— open end
— Box Socket
— Detachable Socket
— Construction Ratchets



There are ARMSTRONG Wrenches for your every need and each is the finest tool of its type.

ARMSTRONG Socket Wrenches extensions and handles are Chrome-Vanadium Steel. Ratchets are drop forged steel and the patented ARMSTRONG Drivelock locks sockets, driver, ratchets and handles to each other — will not knock or pry apart, sockets can not fall off.

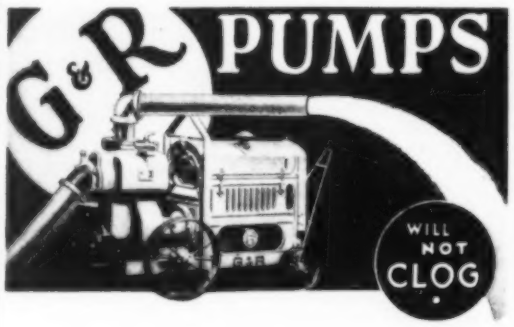
ARMSTRONG Giant Construction Ratchets are *drop forged* steel. Nut sockets are *machined* from solid bar stock.

ARMSTRONG Drop Forged Structural and Construction Wrenches come in several types, in high carbon or Chrome-Vanadium steel. Large stub end box socket wrench takes long slip over handles.

Write for Catalog

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
334 N. Francisco Ave.
Chicago, U.S.A.
Eastern Warehouse & Sales:
199 Lafayette St., New York

G&R PUMPS



The Most DEPENDABLE Pump For The Least Money

Claims of fastest priming, highest suction lift, more gallons per minute, etc., do not pump water. On the job, the pump must do its own talking, and with dirty water, many a pump is inclined to stutter — and stop.

Let G & R Pumps tell you their own story on any job. They will deliver as much, and usually more, water under any condition, than any other pump. We will ship you one and let you be the judge.

Remember this about G & R Pumps — THEY WILL NOT CLOG—THEY ASK NO TIME OUT. Play safe! That is why more contractors are standardizing on G & R Pumps than on any other make.

Distributors in 100 principal cities are ready to make prompt delivery of the G & R Pumps you need.

THE GORMAN-RUPP CO. Mansfield, Ohio

NEWS FROM MANUFACTURERS *About Their Products*

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

BUILDING MIXERS — **Chain Belt Co.**, Milwaukee, Wis. (44 pp., illustrated.) Complete line of Rex concrete building mixers from 3½S size up to 14S. Feature of catalog is ready-reference "tab" indexing (like dictionary) which sectionalizes contents by machines and design details. Large-size photos illustrate job applications. Among mechanical features emphasized are die-formed, three-way drums, shimmy charging skips which "kick" batch into drum without loss of time, accurate water-measuring system, cushioned power with chain belt drive, easy arc controls. For special mixer service a number of accessories is available, including electric drive, low charging hopper, charging skip extension, truck-loading skip, and long distributing spouts. Complete specifications are tabulated for six models.

★ ★ ★

INDUCTION MOTORS—**General Electric Co.**, Schenectady, N. Y. (12 pp., illustrated.) Publication GEA-3580 gives highlights on design, construction, and application of line of Tri-Clad motors. Booklet takes motor apart to show how extra protection has been built into Tri-Clad line of motors. Particular attention is called to motor's one-piece, cast-iron frame and end shield for protection against physical damage; stator windings of tough Formex wire for protection against electrical breakdown; and new design of bearings for protection against operating wear and tear. Photographs show many types of Tri-Clad motors now available and some typical industrial applications.

★ ★ ★

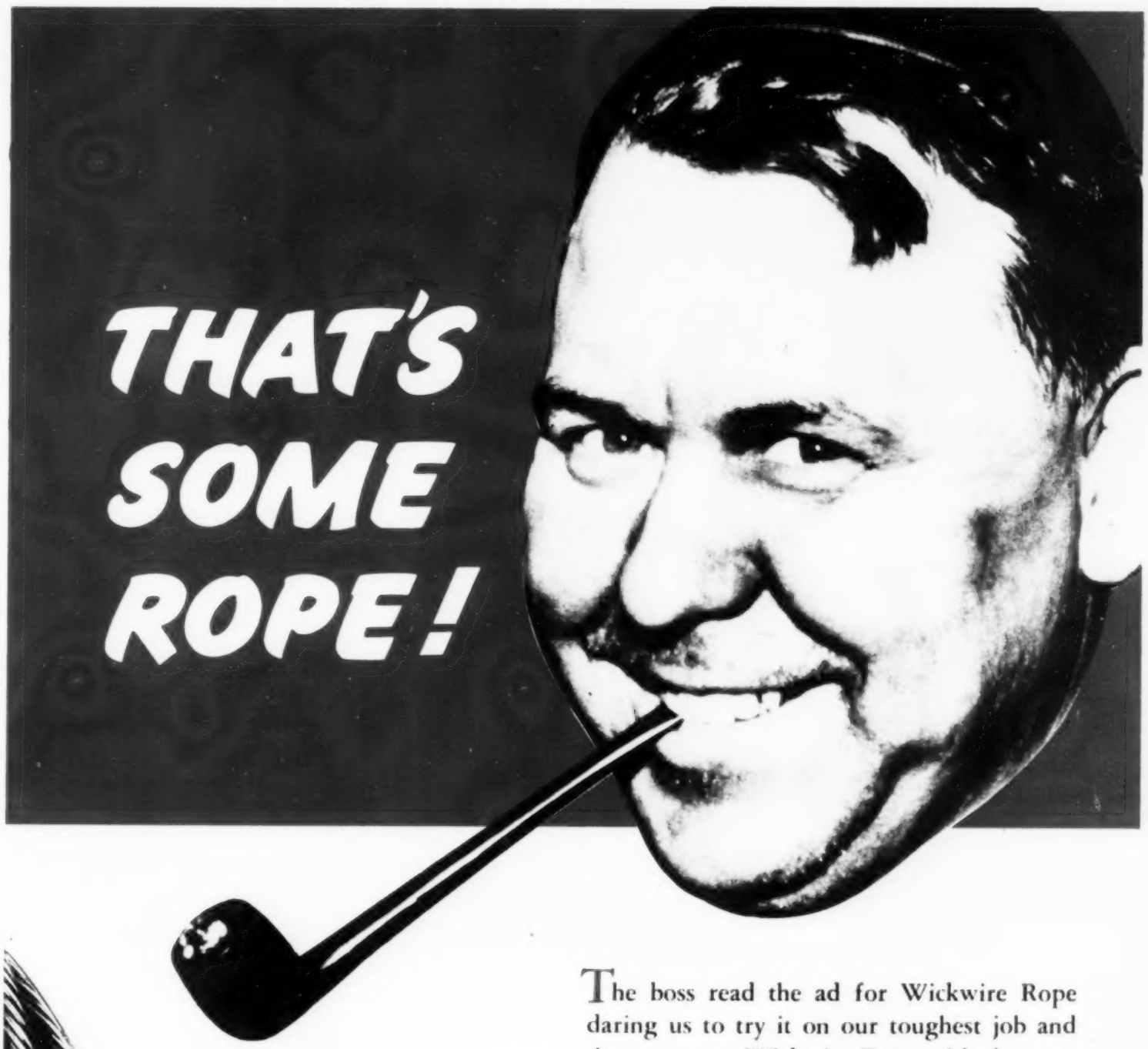
FLOODLIGHTS—**Westinghouse Electric & Manufacturing Co.**, East Pittsburgh, Pa. (2-p. leaflet, illustrated.) Describes complete line of types A-8 and A-10 universal weatherproof floodlights. A list of typical and useful applications is given along with a complete description of the fixture, including specifications for the various fixture parts. A price tabulation shows list prices for all of the twelve standard styles of both the A-8 and A-10 units. A table of photometric data gives information on beam spread and beam output in lumens. Dimensions are given for each unit in the form of convenient sketches. The A-8 is an 8-in.-diameter unit utilizing a 100-watt lamp; the A-10 is 10 in. in diameter, uses a 200-watt lamp.

★ ★ ★

PORTABLE MATERIAL ELEVATOR—**American Hoist & Derrick Co.**, St. Paul, Minn. (4 pp., illustrated.) Tower-elevator rig for small builder and contractor. Hoists brick, mortar, cement and other materials. No guys needed. Capacity, 2,500 lb., height of tower, 46½ ft. Powered by 21-hp., 4-cylinder gasoline hoist. Total weight, 5,900 lb.

★ ★ ★

LUBRICATION HANDBOOK—**Valvoline Oil Co.**, 586 East 5th St., Cincinnati, Ohio. (64 pp.) Dealing with passenger cars, trucks and tractors, text covers such topics as four main functions of oil as a lubricant, crankcase drainage in summer and winter, flat lubrication, avoidance of carbon deposits in engine, oil viscosity. Descriptive matter on various kinds and grades of lubricants for gears, chassis, wheel bearings, etc. Series of charts shows recommended lubricants for crankcase, transmission and differential on all standard makes of cars, trucks, tractors and industrial engines. Performance data on Valvoline lubricants is included.



The boss read the ad for Wickwire Rope daring us to try it on our toughest job and then compare Wickwire Rope with the rope we were using.

I said it was the usual advertising bunk.

But the boss is a tough guy who will always take a chance when he thinks he is going to win, so in came the rope and I put it on. When it got to the time when we usually change rope, that Wickwire Rope was going strong. Then I got interested because changing rope ties up equipment and is a dirty job. That's months ago and no sign of change yet. That Wickwire Rope is some rope!"

WICKWIRE SPENCER STEEL COMPANY

General Offices: 500 Fifth Avenue, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

BROTHER!

HERE'S THE WAY TO CLIP WIRE ROPE WITH A *FIST GRIP*... NOT A ROPE CRIMPING "FINGER-PINCH"

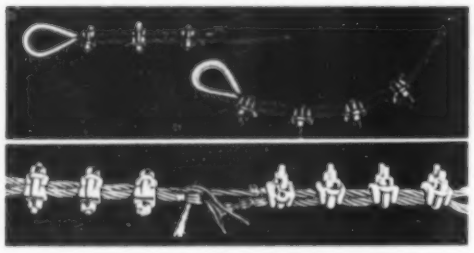
Laughlin drop forged Safety Clips *grip* around wire rope like a *fist* — the rope stays straight — uncrimped — can be used again when the clips are removed.

None of the narrow "finger-pinching" you get with ordinary U-Bolt clips which bow the wire — crimp it — and eventually break it.

Write for free booklet describing tests illustrated below. It will show you how to save on both rope and clips. Use handy coupon below — and mail it today!

YOU NEED FEWER CLIPS

Use 3 Laughlin Safety Clips instead of 4 U-Bolt clips — get the same strength.



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Tests like this—made by a famous engineering school — proved Laughlin Safety Clips delivered better than 95% rope efficiency.

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Send me free Safety Clip booklet. G-7

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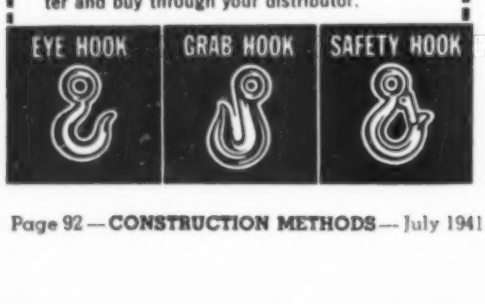
Check here for catalog on items below ☐

Look for Laughlin products in Thomas' Register and buy through your distributor.



Navy Yard Water Supply

(Continued from page 67)

porting the wall footings, and wall reinforcement was anchored to these rods.

C. W. Lockwood built the reservoir under a $65,000 contract. B. F. Sawyer was the contractor's superintendent on the job. The 200,000-gal. elevated tank, 134 ft. in height to the high water line in the tank, was erected by the Chicago Bridge & Iron Co. with William Sousa as foreman in charge at the site. Comdr. A. K. Fogg (CEC) U.S.N. is public works officer in charge of construction at the Norfolk Navy Yard.

MEASURING 134 FT. above ground to high water level, elevated steel tank maintains uniform pressure on distribution system inside Navy Yard.

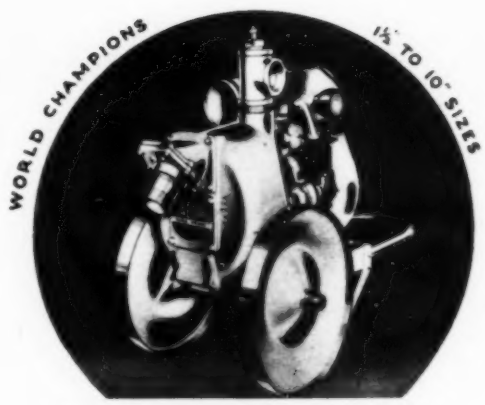
* * *

Wood Frame Tent Camp

(Continued from page 52)

tions until the end of March when construction was started on 23 mi. of road, including both concrete and asphalt surfacing on a 12-in. base of rolled red rock.

Another item in the camp's transporta-



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Modern CRANES and SHOVELS

BYERS
RAVENNA, OHIO

tion facilities was the building of 6.2 mi. of standard gage railroad spur track and sidings connected with the main line of the Southern Pacific. Included in this project, which cost $582,430 was 300,000 cu.yd. of grading and two pile trestles.

Personnel—In charge of constructing Camp San Luis Obispo for the U. S. Army was Major D. P. Lane, constructing quartermaster, with the firm of Leeds, Hill, Barnard and Jewett, of Los Angeles, serving as architect-engineer. For the general contractor, L. E. Dixon Co. of Los Angeles, W. N. Evans was project manager and K. L. Parker, general superintendent.

* * *

Rainbow Bridge HAS 950-FT. STEEL ARCH

(Continued from page 48)

arch in position: On the top of each of the Canadian and American abutments steel towers, 130 ft. tall, were built. Sections of the arch were delivered to the head of each abutment and then lowered by an 85-ton derrick into the gorge where they were received by a 40-ton stiffleg derrick which traveled on the arch and set each section into place. A fan-like series of cables from the towers supported the steel arch sections over the river. Corresponding cables from the towers extended back 200 ft. where they were anchored to deadmen of concrete weighing 600 tons each and firmly embedded in the solid rock of the top level of the gorge. The same procedure was followed simultaneously from each shore.

With all sections in place a temporary steel key about 11 in. wide was used to join the 475-ft. sections extending from each shore. This was later replaced with a permanent key carefully machined to fit to 0.01 in. With this piece set, the arch became self-supporting upon its abutments, allowing removal of the temporary cable supports and towers.

The steel arch is joined on each shore by four concrete approach arches with foundations in the rock of the face of the gorge. The joint between the steel arch and abutment is made by a 60-ton grillage and skewback bolted to the abutment at each terminal with 32 anchor bolts set in the concrete.

The deck of the bridge will be 1,450 ft. long with two 22-ft. roadways separated by a 4-ft. central mall and a 10-ft. sidewalk along the south side, facing the Falls. The span will be practically level and on grade with the natural top level of the gorge. With no other superstructure than its railings the Falls and turbulent river below will be in the open view. Because of its location in a setting of famous

(Continued on page 94)

TRACTION

With two driving axles under the load instead of one, you are able to haul bigger payloads.

With double the tractive effort obtained with the THORNTON two-speed gearcase, you can keep going when conditions are tough.

You get more flexibility with two transmission ratios—one for power, one for speed.

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YOU SAVE MONEY because your initial investment is reduced 25 to 40%. Users report operating and upkeep costs 30 to 50% lower.

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SKILSAW TOOLS SAVE DAYS and DOLLARS for DEFENSE!

LOOK at the jobs these tools will do for you to speed up *every* operation . . . to cut *every* cost . . . to make *every man* and *every minute* more productive!

SKILSAW speeds up all wood sawing . . . sizes precast concrete blocks . . . cuts Celotex, Transite and other compositions . . . cuts metals, scores stone, tile, etc. 9 models.

SKILSAW DRILLS speed up installation of pipe, conduit, fixtures, hardware. "Extra-powered" for faster drilling in wood, steel, compositions. 22 models.

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SKILSAW DISC SANDERS speed up concrete surfacing, form cleaning, webb removal and stone facing . . . on flat or curved surfaces. 5 models.

You need *all* these SKILSAW TOOLS to keep up today's peak pace . . . to make skilled hands more productive . . . to make America strong . . . to get more jobs done—quicker, better . . . at greater profit!

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36 East 22nd St., New York—52 Brookline Ave., Boston—15 S. 21st St., Philadelphia—29 North Ave., N.W., Atlanta—182 Main St., Buffalo—2902 Euclid Ave., Cleveland—1535 Grand Ave., Kansas City, Mo.—918 Union St., New Orleans—2124 Main St., Dallas—2645 Santa Fe Ave., Los Angeles—2065 Webster St., Oakland—1115 E. Pike St., Seattle—Canadian Branch: 85 Deloraine Ave., Toronto.

SKILSAW PORTABLE ELECTRIC TOOLS

YOUR DEALER WILL GLADLY DEMONSTRATE THESE TOOLS FOR YOU

(Continued from page 93)

beauty, as well as for reasons previously stated, this type of bridge was decided upon.

The American and Canadian approaches to the Rainbow Bridge are classed with the most beautiful in the world. There will be 12 approach traffic lanes on the New York side and 14 on the Ontario side to facilitate government customs inspection which has now been reduced to more or less of a mere formality. Facilities will be provided at each terminal for housing toll collectors, government inspectors and others, and also concessions rendering service to travelers. The housing on the American side will be of formal neo-classic architecture following two sweeping curves across the plaza approach. More than 50 per cent of all visitors to Canada enter via the Niagara peninsula; most of them, it is predicted, will use this crossing.

The Niagara Falls Bridge Commission, the Ontario Department of Highways, and the Niagara Parks Commission have cooperated in making the Canadian terminal an equally outstanding example of beauty and utility. In construction of the Canadian plaza an entire neighborhood of nondescript buildings was razed on lands condemned by the Province of Ontario. Upon completion, the bridge will be joined by a spur, underpassing local traffic and providing a direct connection with Queen Elizabeth Way, Ontario's recently built 100-mi. express highway between Fort Erie and Toronto.

Administration

The Rainbow Bridge was built under the auspices of the Niagara Falls Bridge Commission, consisting of eight members, four appointed by the Governor of New York, and four by the Lieutenant-Governor of Ontario in Council. The project was financed by the proceeds of a $4,000,000 bond issue.

Wadell & Hardesty of New York and Edward P. Lupfer Corp. of Buffalo, N. Y., are the consulting engineers. The Lupfer corporation, represented by R. W. Cady as resident engineer, is in direct charge of field operations. Hagey & Grey of Fort Erie Ontario are engaged in field inspection on the Canadian side. Aymar Embury II of New York is consulting architect.

The McLain Construction Corp., of Buffalo, N. Y., are contractors for the foundations and concrete approaches on the American side. Aiken & McLachlan Ltd., of St. Catharines, Ont., are the contractors for the foundations and the concrete approaches on the Canadian side. The Bethlehem Steel Co. of Bethlehem, Pa., is the contractor for the steel arch span, with the Canadian Bridge Co. of Walkerville, Ont., associated with them in the fabrication of steel work manufactured in Canada. Parsons, Klapp, Brinckerhoff & Douglas of New York are traffic engineers.

The site for the bridge was dedicated by their Majesties King George VI and Queen Elizabeth when the Royal couple visited the United States and Canada in 1939 and is commemorated by a monu-

(Continued on page 96)

NEW METHODS IN FOUNDATION ENGINEERING MAKE FOR GREATER SPEED AND ECONOMY IN CONSTRUCTION

This book systematically and comprehensively covers the entire subject of bridge and building foundation work as represented by the best American practice—with complete attention to the newest methods, the latest changes and the best engineering progress of recent years. Here are up-to-the-minute, cost-saving facts on all details of foundation work, covering:

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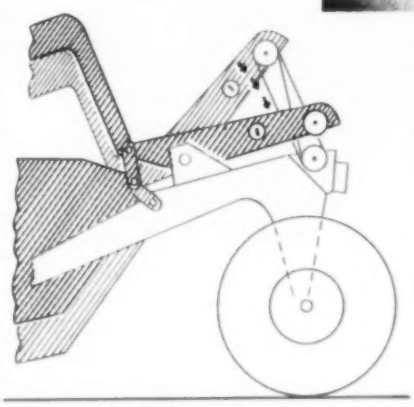
HEIL TWIN-CABLE SCOOPS GIVE YOU FASTER DIRT MOVING —AND LOWER CABLE REPLACEMENT COSTS!

Heil Twin-Cable Scoop. Raised Jack-Arm lowers bowl to normal digging position.

Heil Jack-Arm Lever Raises and Lowers Scraper Bowl Faster—and Requires Less Cable Pull

Experienced Scraper Users, who see the HEIL TWIN-CABLE SCOOP perform for the first time, are invariably impressed with the fast raising and lowering action of the bowl. The Jack-Arm Assembly (Figure (1) in the diagram at right) uses the mechanical advantage gained by use of leverage to achieve a fast lifting action.

In addition, the Jack-Arm lever action reduces the number of sheaves and the length of lift cable required for operation. Most important of all, however, is the fact that the raising action is accomplished by the Jack-Arm with *50% less cable pull* than would be required with an all-cable lift. Fewer sheaves, shorter cables, and lower line pull insure longer cable life—and save you money on cable replacement costs!



Arrows Indicate Direction to Raise Scraper Bowl.

It will pay you to investigate the money-saving advantages of Heil Twin-Cable Scoops. See your nearest Heil Distributor, or write, today, for full details.

(Second Advertisement in a Series explaining operating advantages of Heil Twin-Cable Scoops)

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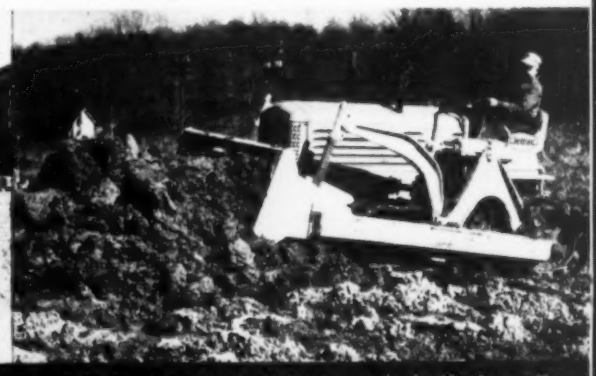
Heil Twin-Cable Scoop. Lowered Jack-Arm Raises Bowl to Carrying Position.

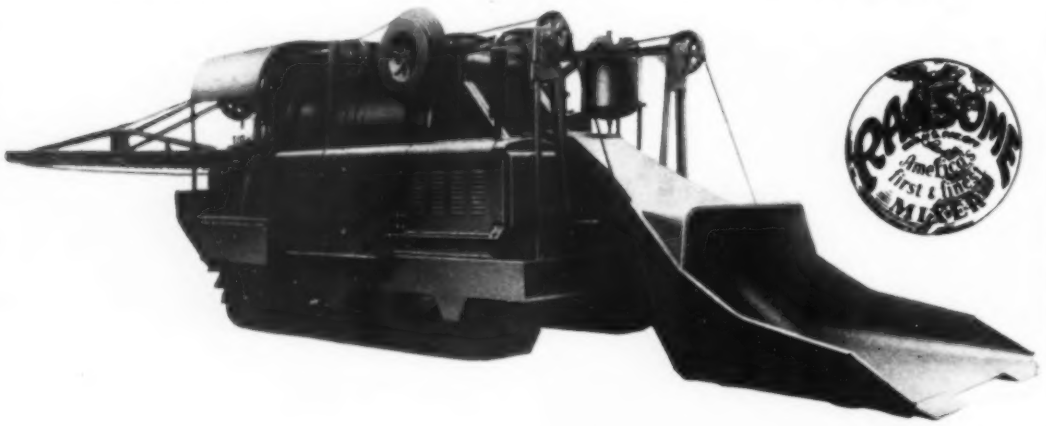
Heil Hydraulic Dump Units. Fast-operating — Rugged — Powerful.



Heil Hydraulic Bulldozers are built for all Cleveland Tractor Models.

EIGHT OUTSTANDING FEATURES OF THE Ransome 34E "DUAL DRUM" PAVER

1. Larger engine—slower speed—longer life.
2. Hydraulic "Finger Tip" controls.
3. Bullwheel cable boom swing.
4. Swing boom and spread simultaneously—saves pitmen—prevents dumping outside forms.
5. Batch meter on each compartment for accurate timing.
6. Fast transfer and fast skip for high speed operation.
7. Fast mixing action, fast discharge, accurate water control.
8. High carbon steel liners in shell and on mixing blades.



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COOL-CLEAN-WATER AND SALT GIVE HEALTH & STRENGTH TO YOUR WORKMEN

Meets the requirements of all Public Health Authorities →

FULLY INSULATED 4 GAL CAPACITY

Saves Money on the Job

● Eliminates pails, kegs, dippers, individual cups. The Dobbins Portable Drinking Fountain and Salt Dispenser saves pay roll losses, prevents heat prostration, cramps, etc. Men on any job can now be assured the same protection from disease spreading drinking equipment that is afforded in modern plants.

SALT DISPENSER
Capacity 500 Tablets

● No. 3 Adjustable Waterproof Shoulder Carrying Strap

● 3 WAY MOUNTING BRACKETS
For trucks and tractors.
For inside and outside use.

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. . . HERE, UNDERPASSES UNDER RAILROAD TRACKS!

● To fully realize the value of COMMERCIAL LINER PLATES, one has only to consider their variety of uses. Here, COMMERCIAL Plates are saving time in the driving of tunnels under railroad tracks . . . their use eliminating the digging of an open trench that holds up traffic. Too, the COMMERCIAL self-supporting tunneling method is less hazardous and more economical . . . it allows "holing through" in the shortest possible time. Consider the many benefits of COMMERCIAL Plates—many types and sizes for every condition of ground; all-over installation savings; greater safety—then choose COMMERCIAL for your next job. A letter will bring descriptive literature and prices.

The COMMERCIAL SHEARING & STAMPING CO.
YOUNGSTOWN, OHIO

(Continued from page 94)

ment at the Canadian terminal. Ground was broken for the Rainbow Bridge on May 16, 1940 and first steel was placed into position and dedicated by Hon. T. B. McQuesten Feb. 17, 1941.

★ ★ ★

Bituminous Paving Applied to Relocated Cape Cod Canal Highway

(Continued from page 61)

at a bid price of $303,077 for a width of 40 ft. paved with a bituminous surface of the Warren "Penolithic" type.

The project involved fairly heavy cuts (60 ft.) and fills (30 ft.), granite curbs, a 7-ft. sidewalk and lengths of all-metal multiple-strand cable guard rail. The major contract quantities and unit prices are summarized in the accompanying table.

A novel feature of the job was the necessity for relocating a small stream crossing the highway and confining it within a stepped concrete channel to provide a "run" for herring seeking spawning grounds above the canal water level.

Equipment

Earth excavation amounting to approximately 388,000 cu.yd. of sandy soil was handled by four power shovels—two 1½-yd. Lorain and two 1½-yd. Bucyrus-Erie units—served by a fleet of 35 Sterling 8-ton motor trucks with 5-yd. bodies. Supplementary equipment included five Allis-Chalmers tractors for bulldozer work on earth fills amounting to 378,000 cu.yd., and a Lorain crawler crane for concreting and clean-up work.

For the new pavement a 6-in. gravel sub-base was placed to drain and support a 4-in. (compacted) depth of broken stone base, bound with sand, which is plentiful along the right-of-way in this locality. The top course is a 2½-in. compacted layer of broken stone, oiled and penetrated with hot asphalt, and covered with a surface layer of screenings. The finished road surface has a crown of ¼ in. per foot of width.

In the Penolithic patented type of bituminous construction, an essential feature of the process consists in first applying to the surfaces of the broken stone for the top course a thin film of non-volatile, mobile oil. This application, it is claimed, nullifies the effect of dust on the stone surfaces and induces the hot asphalt, when sprayed from a pressure distributor, to flow around and under the individual stones of the pavement, insuring thorough coverage and effective bond between asphalt and stone. This preliminary oiling treatment permits the use of a hard asphalt cement (50-60 penetration) to increase the strength and

stability of the structure as a whole. For both the 4-in. base course and the 2½-in. top course, a No. 1 broken stone coarse aggregate is used, passing a screen with 2¼-in. square openings and retained on a screen with 1¼-in. square openings. Rolling is done with a 10-12-ton roller.

As defined in the specifications the method of constructing the Penolithic wearing surface course is substantially as follows:

Upon the prepared base is spread the layer of oil-treated aggregates compacted by rolling to the required 2½-in. thickness. This layer is then penetrated with hot asphalt. Oil-treated intermediate aggregate is next spread and rolled into the asphalted surface substantially to fill the surface voids. A seal coat of hot asphalt is finally applied and covered with fine stone.

The surface course is penetrated with hot asphalt at the rate of 1¾ gal. per square yard and after being covered with keystone to fill the voids is sealed with an asphalt application of ⅜ gal. per square yard. Pea stone is spread over the seal coat, and the surface is given a final rolling. The finished surface is required to meet a smoothness test in which a 10-ft. straightedge laid parallel to the center line of the road shows no deviations greater than ¼ in.

Along the sides of the paved roadway is set a total of 31,330 lin.ft. of 5x16-in. granite curbing. To insure safety for traffic 19,500 lin.ft. of multiple-cable guard rail is installed. At several points along the route the pavement is widened to provide parking areas from which occupants of automobiles command a view of the Cape Cod canal.

The paving of the highway along the Cape Cod canal was done by the Eastern Contracting Co. of Quincy, Mass., under the direction of the Massachusetts Department of Public Works for which, at the time, George H. Delano was chief engineer, R. W. Coburn construction engineer, F. T. McAvoy, senior civil engineer and John E. Troy, district engineer. Mr. Delano has since been succeeded by Mr. Coburn, with Mr. McAvoy now acting as construction engineer for the department.

★ ★ ★

Skyscraper Piers

FOR PIT RIVER BRIDGE

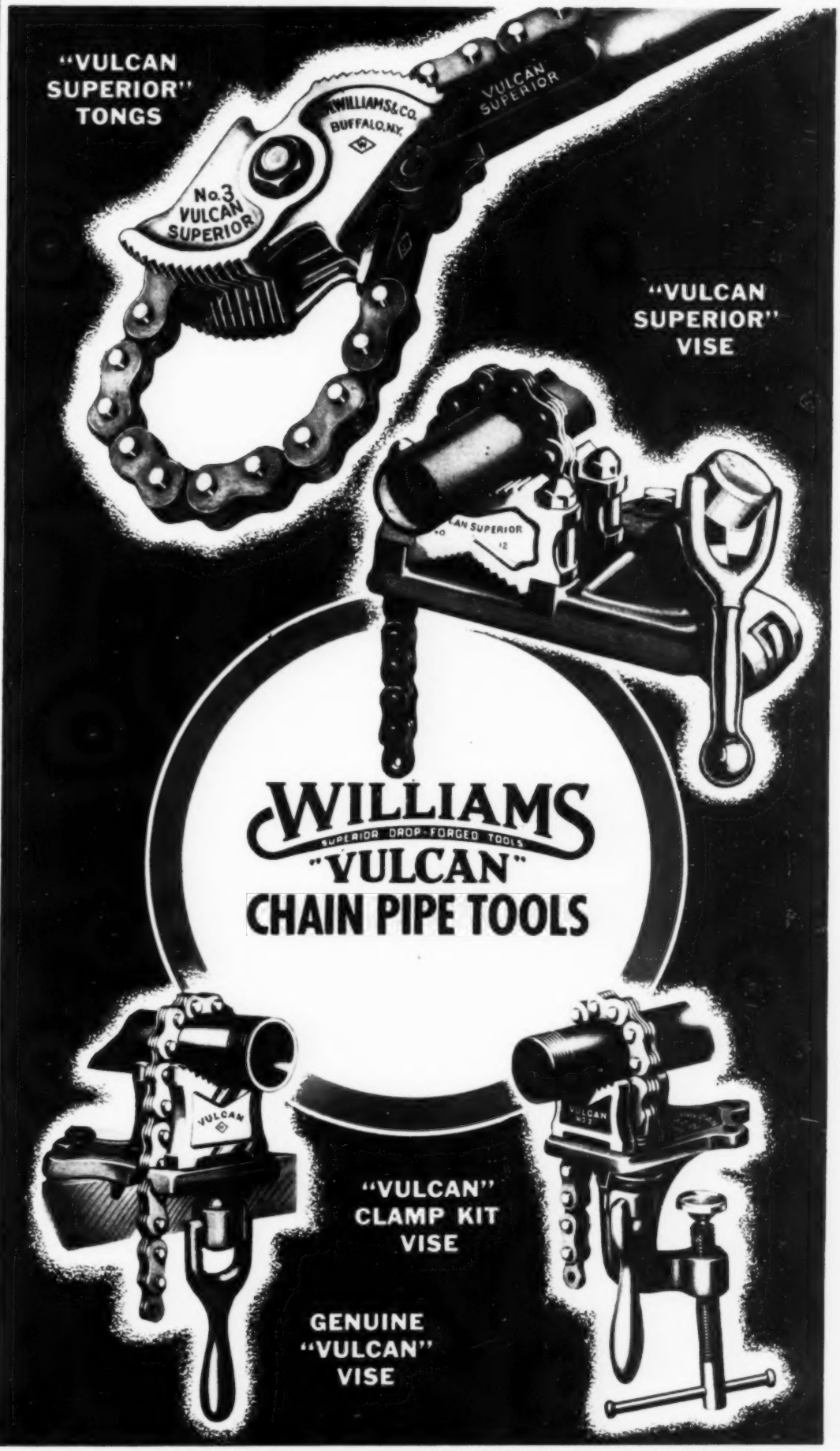
(Continued from page 62)

cal members consisting of second-hand 60-lb. T-rails. This framework was employed to guide and carry the steel reinforcement and to support the inner concrete forms for the hollow cells within the large piers.

All materials except concrete were handled by a derrick boom mounted on a steel frame elevator tower and raised pe-

(Continued on page 100)

BETTER WORK . . . MORE OF IT!



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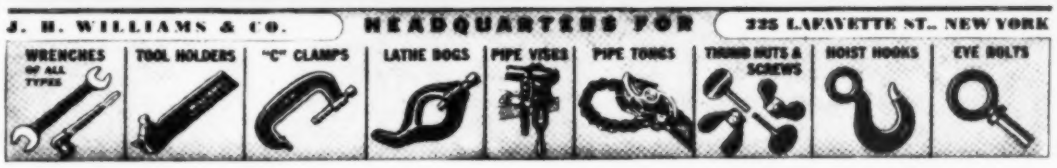

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Part of Pacific Coast Aggregates, Inc., fleet of 25 Smith-Mobiles.

Pacific Coast Aggregates, Inc., sent in their initial order for two Smith-Mobile Truck Mixers in July 1939. Another order for two machines followed the same month — three more in October 1939 — three more in November 1939 — seven more in February 1940 and three more in January of this year. Surely, such preference must be deserved. The many repeat orders came as a result of satisfactory performance. The company liked the HIGH DISCHARGE feature . . . CONTROLLED DISCHARGE without segregation... VISIBLE MIXING... Fast FEED CHUTE Charging, etc. All standard sizes available. Write for catalog 198-A.

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2. Make very certain that you buy a *good* Hydraulic Jack! There is as much difference in jacks as in watches—and a jack at any price is worthless unless it continues to serve its purpose in every emergency.

LOOK FOR THE "SERVICE-PROVED" SEAL — tagged only on Blackhawk Hydraulic Jacks. This is your assurance that you are getting Dependability, Performance and More-for-your Money! The "Service-Proved" Seal is backed by the experience of over a million Blackhawk Jack owners. Blackhawk introduced the first line of perfected Hydraulic Jacks in 1926 and has pioneered the advances which have yet found no imitators! *Write for new Catalog 41H.*

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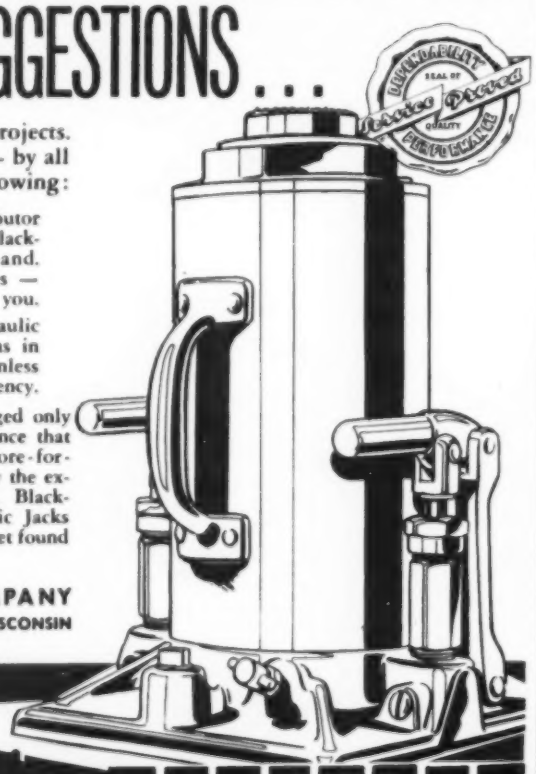

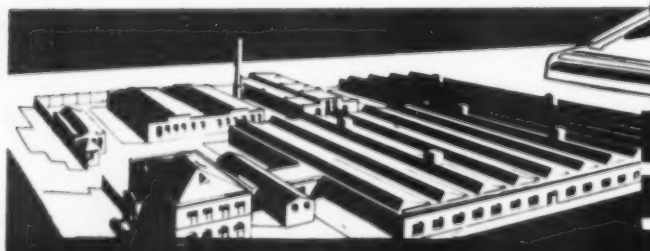

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Send new catalog featuring Blackhawk Hydraulic Hand Jacks, Gauge-Equipped Jacks, Porto-Power Remotely Controlled Jacks, Pipe Benders and Wrenches.

Name .....

Company .....

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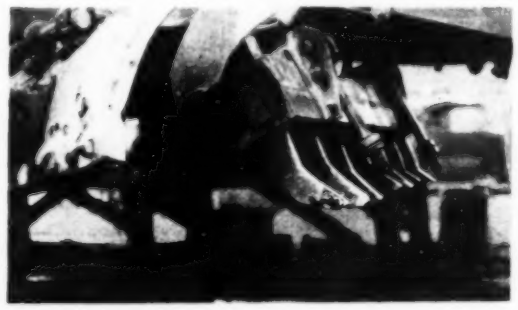
Hard Facing Makes Ripper Teeth Last Longer

RIPPING UP OLD PAVEMENT was the job assigned to the street department of one western city. In this type of work, a combined scarifier and grader is provided with teeth that tear up the pavement while a blade, behind the teeth, pushes the broken material off the road bed. A particularly difficult wear problem presented itself in one part of the job, according to "Oxy-acetylene Tips," because here the paving, a road-mix of gravel and oil, was abrasive and was packed extremely hard. How abrasive it was is indicated by the fact that the standard steel teeth became so hot that the points wore off in 2 to 4 hr.

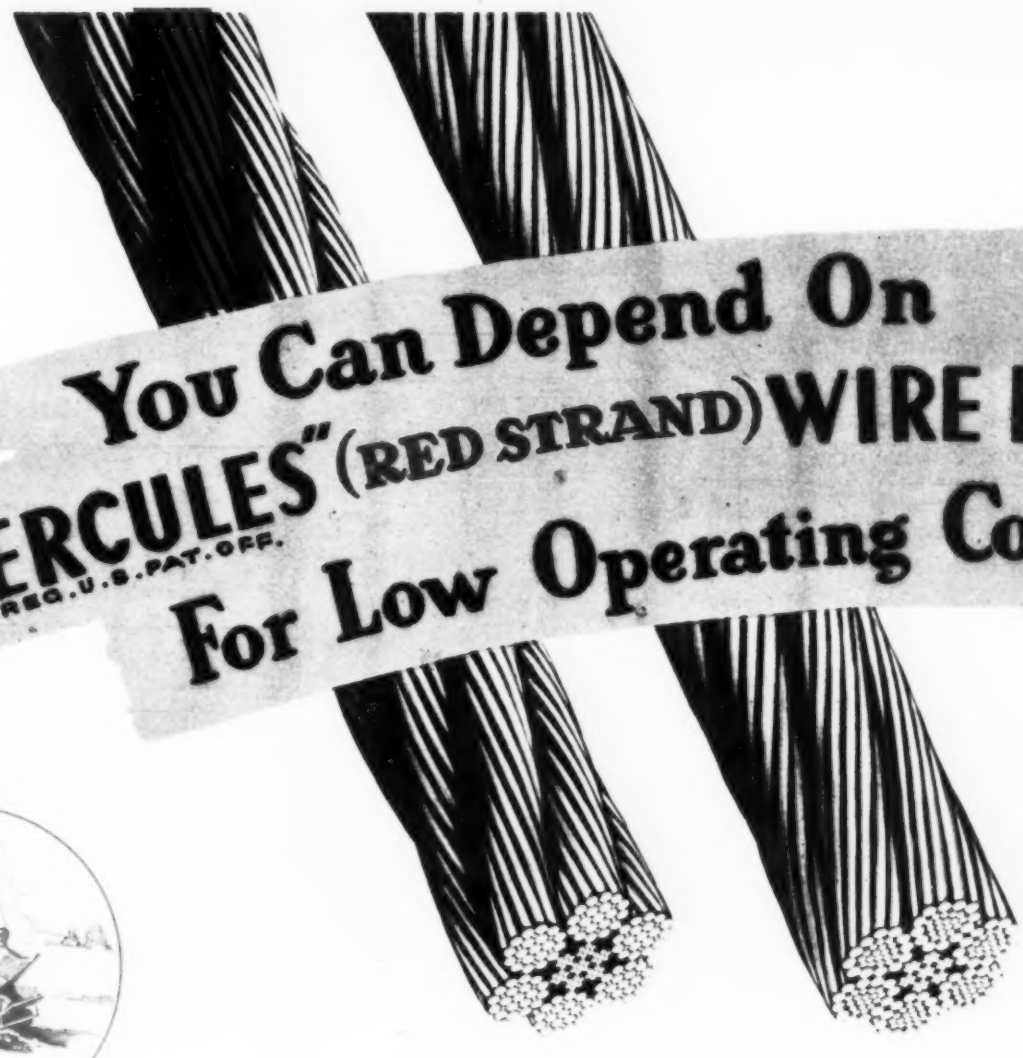
New teeth, bought with the ends cut off for hard-facing, were built up with two Haystellite No. 1 inserts bonded to the end of each tooth with Haynes Stellite rod. After two shifts, teeth of this type were worn but could still be rebuilt economically.

WORN SCARIFIER TEETH. No. 1 shows plain steel after one shift's wear. No. 2 is hard-faced steel after two shift's wear.

In another location the teeth were used to cut under a plant-mix type of paving to a depth of about 5 in. The top crust of the mix caused a severe cutting action on each tooth about 5 in. above the point. In some instances this abrasion was so severe that it almost cut the teeth in two. The solution to this problem was found when hard-facing was carried up the point about 6 in. A tooth with two Haystellite inserts on the point, and with a Haynes Stellite alloy deposit extending about 6 in. up from the point finished the job satisfactorily. The hard-faced steel was found to have a useful life about eight times longer than that of plain steel.



HARD-FACED and hard-set steel ripper teeth resist wear in scarifier.



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Production requirements must be met. Why not let "HERCULES" (Red-Strand) Wire Rope help you meet this demand and still maintain a reasonable margin of profit?

You can rely on "HERCULES" to keep costs down, because it is made on the principle that—*"With wire rope it pays to use the best"* . . . In its entire process of manufacture, exacting tests and rigid inspections leave nothing to chance. All this, plus manufacturing efficiency, means longer rope life at no higher cost.

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WIRE ROPE MAKERS — ESTABLISHED 1857

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● When the digging is tough — that's when a Williams proves the extraordinary power and ruggedness built into it. Watch it bite into "hard stuff" and come up with full capacity loads that spell time saving and profitable yardage. Williams Buckets embody many exclusive features that give them unusual power and longer life.

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WILLIAMS *Buckets*
***built by* WELLMAN**

A Knockout Blow!
to large, cumbersome compressors on many of your jobs

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are lightweight, sturdy and exceptionally low-priced

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MORE PROFIT LESS MAINTENANCE...
when they're on the job . . .

Here's a one-man tool that can do a hundred and one jobs on any construction project. One man and a Coffing Safety-Pull can lift, pull, move, and do many emergency and repair jobs. When used in batteries they exert powerful uniform action that makes them invaluable for certain kinds of construction work. Let us send you circulars telling all about Coffing Safety-Pull Hoists — their safety features — their efficiency — their easy portability — their low first cost.

WRITE FOR CATALOG CMG-4

COFFING HOIST COMPANY
DANVILLE ILLINOIS

(Continued from page 97)

riodically as work progressed. Concrete was discharged into the skip of the vertical elevator tower and raised to the tops of the forms where it was delivered by buggies into hoppers on the ends of elephant trunks extending down into the forms. Concreting was done in 30-ft. vertical lifts before raising the placing equipment to the next pouring level.

Outside forms consisted of 8x12-ft. wood panels held 6 in. away from the outer row of 2-in. reinforcing bars by ⅝-in. rods and she-bolts fastened to ¼-in. hairpins previously embedded in the concrete. Concrete was consolidated around the heavy reinforcement by vibrators.

The heavy 2-in. steel reinforcing bars were delivered to the job in 60-ft. lengths each weighing 813 lb. and raised to place by the derrick boom on the elevator tower. Prior to making the butt-weld connection, the lower end of each new bar was clamped to the upper end of the corresponding bar previously set in position. The ends of both bars were cut at 45-deg. bevel and the joint then was made by welding, using 1½ to 1¾ lb. of Fleetweld metal per joint. Prior to making each weld, abutting bar ends were heated by two-flame gas burners to about 500 deg. F. The two largest bridge piers required 2,926 and 3,896 welds, respectively, in the 2-in. square reinforcing bars.

The Pit River bridge is being built under the direction of the U. S. Bureau of Reclamation, for which R. S. Calland is acting supervising engineer for the Central Valley project and Ralph Lowry is construction engineer, Kennett Division. The contractor for the bridge piers, the Union Paving Co., of San Francisco, for whom H. L. Morisette served as general superintendent, sublet the welding of the steel reinforcement to the J-K Welding Co., of Long Island City, N. Y.

★ ★ ★

STEEL BRIDGES RECEIVE *Awards for Beauty*

(Continued from page 68)

Humboldt County, Calif.; total cost, $139,000 (including approaches); engineers: C. H. Purcell, state highway engineer; F. W. Panhorst, bridge engineer, Department of Public Works, Calif.; span lengths, main suspension span, 360 ft.; total length of bridge, 665 ft.; fabricators, Judson-Pacific Co.; owner, State of California.

OCEANIC BRIDGE — Over Navesink River between Locust Point and Rumson, N. J.; total cost, $1,030,000; engineers: Howard, Needles, Tammen & Bergendoff, consultants; Morris Goodkind; fabricators and erectors, Bethlehem Steel Co.; owner, Monmouth County, N. J.; bascule span length, 98 ft. center to center of bearings.

Reinforced Brick Pavement

Uses 8 x 8-in. Square Blocks

(Continued from page 64)

ft. wide, and here again the bricks were laid in a sand bed of varying thickness placed on the subgrade, except that the center 18 ft. was an old concrete foundation from which a brick surface had been removed. On the remainder of the project, 22 ft. wide, a 2-in. concrete base was laid on the subgrade and, before the concrete was set, bricks were placed directly on the foundation. On all of the project a cement grout filler of a consistency permitting a flow that would completely fill the joints and encase the reinforcing bars was used.

Joints for expansion and contraction were placed at 50-ft. intervals. These consisted of lubricated bars ⅝ in. in diameter, inserted in holes in brick on either side of the joint, and a premolded bituminous filler.

On the two sections laid on sand bed longitudinal bars were inserted in the joints and supported in front of the laying operation on "jigs", which rested on side forms and were pushed ahead as laying proceeded. Transverse bars were dropped into place following the placing of each course of brick. This method required the use of two, and part of the time of three men, and there was a rather unsatisfactory result as regards alignment and uniform width of joints. On the section using the 2-in. concrete foundation a steel spacing grid, supported on side forms and containing spaces for three bricks longitudinally, was used. A much better result as regards lines and spacing was obtained by this method. When sufficient yardage was in place reinforcing bars were dropped into position in a fraction of the time required in the other sections. As the three courses outlined by the grid were laid the grid was removed and replaced in position in about 20 sec.

Grout for filling was mixed in a one-bag mixer, placed by means of rubber-tired carts and then squeegeed into place. This operation required a mixer operator, two men loading, and three to six men hauling, the latter depending on the length of haul.

Methods of Handling Brick

Quite naturally in a project entirely new to the contractor's organization, as well as to the supervisory force of the state highway department, there were numerous errors in details of handling the work, with the result that, particularly at the start, production was low and costs were unnecessarily high. For instance, brick were carried from stock piles by hand, using ordinary tongs, and in order to keep the droppers busy nine to eleven men were used as carriers. Later, in the 22-ft. sec-

(Continued on page 102)

Corrugated STEEL SHEET Piling

What It Offers

Corrugated Piling is cold rolled from quality open hearth steel and the depth and closeness of the corrugations give great strength and rigidity without unnecessary weight. It is transported easily; can be handled and set by hand, and driven by hand or light power equipment.

Both the Standard and Interlock sections are designed to give a substantially watertight construction. Economy is one of its outstanding features because, due to its high salvage value, cost can be distributed over many jobs.

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Corrugated Piling has been used successfully by many Federal, State, County and Municipal agencies, as well as contractors, on such work as sewers, cofferdams, bulkheads, bridges, cut-off walls, dams, levees, filtration plants, locks, sewage disposal plants, and for soil erosion and flood control.

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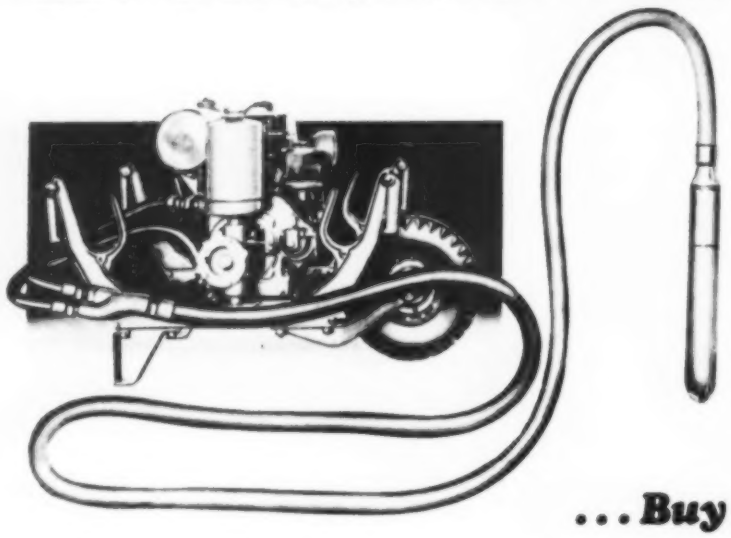
GET DEPENDABLE EQUIPMENT



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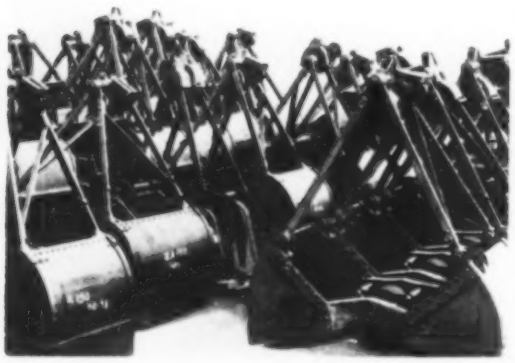

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General Sales Office: 60 E. 42nd St., N.Y.C. Plants: Wyandotte, Mich

(Continued from page 101)

tions, a conveyor was employed, and this reduced the force to five men, two of whom loaded brick on the conveyor and three placed them in position for the dropper. At the start two droppers were used, and sometimes three, for a daily yardage of a little more than 600.

One of these droppers, Roy Swinford, who has, perhaps, laid more brick pavement in Central Illinois than any other man, devised a pair of clamps, one of which was attached to each hand, and by this means could pick up and place the 8-in. square bricks as easily as he could handle an ordinary paving brick. The other droppers, naturally, had to employ both hands to each brick. This practice not only reduced speed, but made it difficult for the droppers to place the units properly, causing a further cost in leveling the surface. As a result the man using the clamps was able to perform more work than both other droppers combined and, actually, the added droppers were a hindrance rather than a help. On the greater part of the project, Swinford alone was used, and the daily yardage increased to 1,000.

Possible Improvements

The method of placing mortar is one that can be greatly improved. A haul of several hundred feet is bound to cause considerable settlement of sand aggregate, and some way of placing mortar directly from the mixer by means of a pumping arrangement, entirely eliminating haul, will give much better results. There may be other ways in which this detail can be handled, and the ingenuity and inventiveness of construction organizations can be depended upon to develop them.

There is considerable difference of opinion as to the proper spacing of expansion joints and, as a matter of fact, as to their actual need. The joints used in the Springfield project leave much to be desired and, in the form used, constitute a structural weakness, especially where bricks are laid in a sand bed laid directly on the subgrade. The steel across the joint develops little if any value as a reinforcement, and has slight practical value in supporting a load passing over the joint. It will be necessary to develop a method in which there will be supporting strength at the joint locations equivalent to that of the pavement between the joints. One suggestion is that, at the necessary intervals, a narrow concrete slab, extending transversely across the pavement, into which the longitudinal steel can be anchored, may be used. No doubt other ideas can be worked out to bring about the desired results.

Specifications called for a roller to embed the brick and to help provide a smooth surface, but a few days' trial showed that the roller specified had no practical value. The large area of the blocks and the consequent distribution of the load prevented its usual result, and hand tamping was resorted to to settle high corners or extra thick blocks. It has been suggested that a device to cause vibration and at the same time bring about

(Continued on page 104)

THE USE OF BULK CEMENT MEANS MONEY IN YOUR POCKET

Save $6342

Facts and figures are available which, based on a year's normal construction operation, show the real money-saving advantages of using bulk cement. Write Blaw-Knox for this tabulation of data and it will be sent to you immediately.

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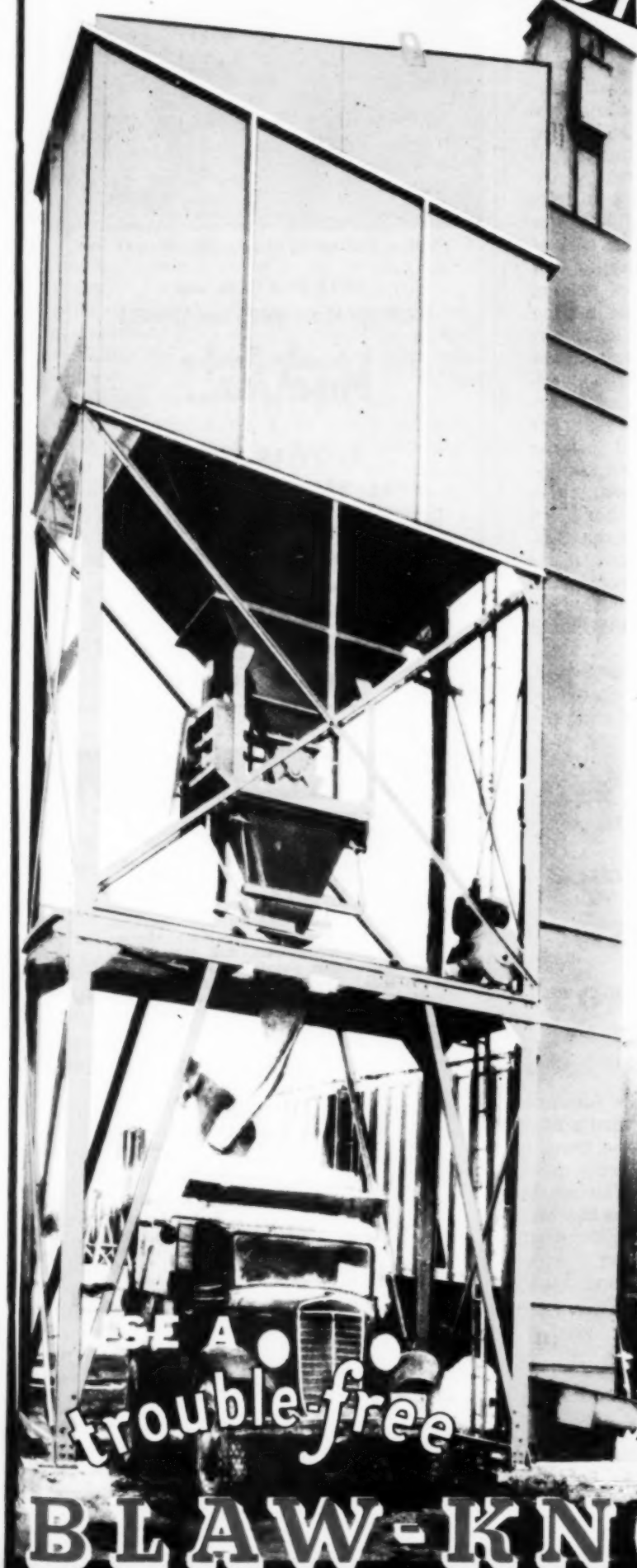

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"Give me a CROSBY CLIP Every time"

It has proved its dependability on every big construction job in this country for the last fifty-eight years.

YOU CAN'T LAUGH OFF A FIFTY-EIGHT YEAR SAFETY RECORD. You get these Safety Features when you Standardize on the Genuine CROSBY CLIP:

1—Correct Gripping Design.
2—Drop Forged Steel Base.
3—Long Base for Greatest Grip.
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5—U-Bolt Threads Galvanized.
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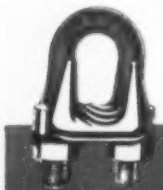
7—Hot Galvanizing Resists Rust, Corrosion.

They're built to grip rope and hang on regardless.

They're the real grab-me-tights — and they're drop forged steel to match the steel cables.

Like the boss says, "Specify Genuine CROSBY CLIPS, give 'em to men who know how to use 'em — and your wire rope fastening troubles are over."



AMERICAN HOIST & DERRICK CO.

CHICAGO ST. PAUL, MINN. NEW YORK

AMERICAN TERRY DERRICK CO. SOUTH KEARNY, N. J.

(Continued from page 102)

a better flow of mortar into the joints and around the bars, permitting the use of a mortar using less water, will be of great value in this operation.

Construction Costs

It must be realized by all practical men that costs on a project of a new type, built by a construction organization with no previous experience in that type, will necessarily be much higher than would be the case in succeeding jobs, and with this in mind, the results in the project under consideration are extremely encouraging. On a production of 1,000 sq. yd. per 8-hr. day, with common labor being paid 80c. per hour and brick dropper $1.75, the cost of handling brick from pile and laying was 4.6c. per square yard. The cost of placing steel was about 0.3c. The cost of mixing and placing mortar was in the neighborhood of 3c., and the cost of trueing up the surface ranged from 1 to 2c. With an estimated cost for superintendence, insurance, office and other overhead of 3.2c. per square yard, this brings the total cost per square yard to 13.1c. This does not include the cost of preparing the sand bed, which is no different from that of any other brick construction. There is little doubt that succeeding jobs will see these cost items greatly reduced and, instead of reinforced brick costing more to lay than the ordinary type, it is quite conceivable that it will be much less.

There were required seventeen 8x8-in. brick, 9.16 lb. of reinforcing steel, 0.0508 bbl. of cement, and 0.0327 ton of sand per square yard of surface.

* * *

Job-Made Device INCREASES SCRAPER LOADS

(Continued from page 65)

the tractor with the hook on the forward end must follow. When the forward scraper reaches the loading point, the tractor behind effects a coupling by merely moving up close behind it and there swinging the coupling hook sideways and to the left. Then, during the loading of the forward scraper, the push of the following tractor is added to the pull of the leader. After No. 1 scraper is loaded, No. 2 begins to pick up its load and thereupon the connection between the two units serves as a coupling in tension and, again, two tractors combine to help a single scraper dig into its load.

With this arrangement, carrying scrapers with a water level capacity of 12 cu. yd. are regularly picking up loads of 10 to 12 cu. yd. of heavy gravel from its original water-laid position — an operation more properly described as "excavating" than as "loading".

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Welding Facilities
EFFECTIVE
AT FRIANT DAM

(Continued from page 55)

shovel buckets, eight or nine different kinds of welding rod in labeled, pigeonholed boxes and an assortment of bolts and nuts such as are frequently needed in making emergency repairs.

The welding shop is served by acetylene gas from an Oxweld acetylene generator (600 cu. ft. per hour) through a 1½-in. pipe. Oxygen is supplied by 20 tanks connected to a manifold so arranged that additional tanks can be cut in as others are exhausted. With most of the work in the welding shop done in two 8-hr. shifts, the oxygen requirement has been ten tanks per 24 hr. or about 2,200 cu. ft. per day.

In the welding shop are also three General Electric welding units of 300- and 400-amp. rating and a butane gas supply which is used for preheating parts to be welded. Three 300-amp. electrical welding units are located on the job at various points outside the shop and there is also a trailer equipped with an oxyacetylene welding outfit, that is left on various parts of the work as needed.

* * *

NAVY SPEEDS
Low Cost Housing

(Continued from page 44)

finish and painting, the total working force employed on the project amounted to about 200 men.

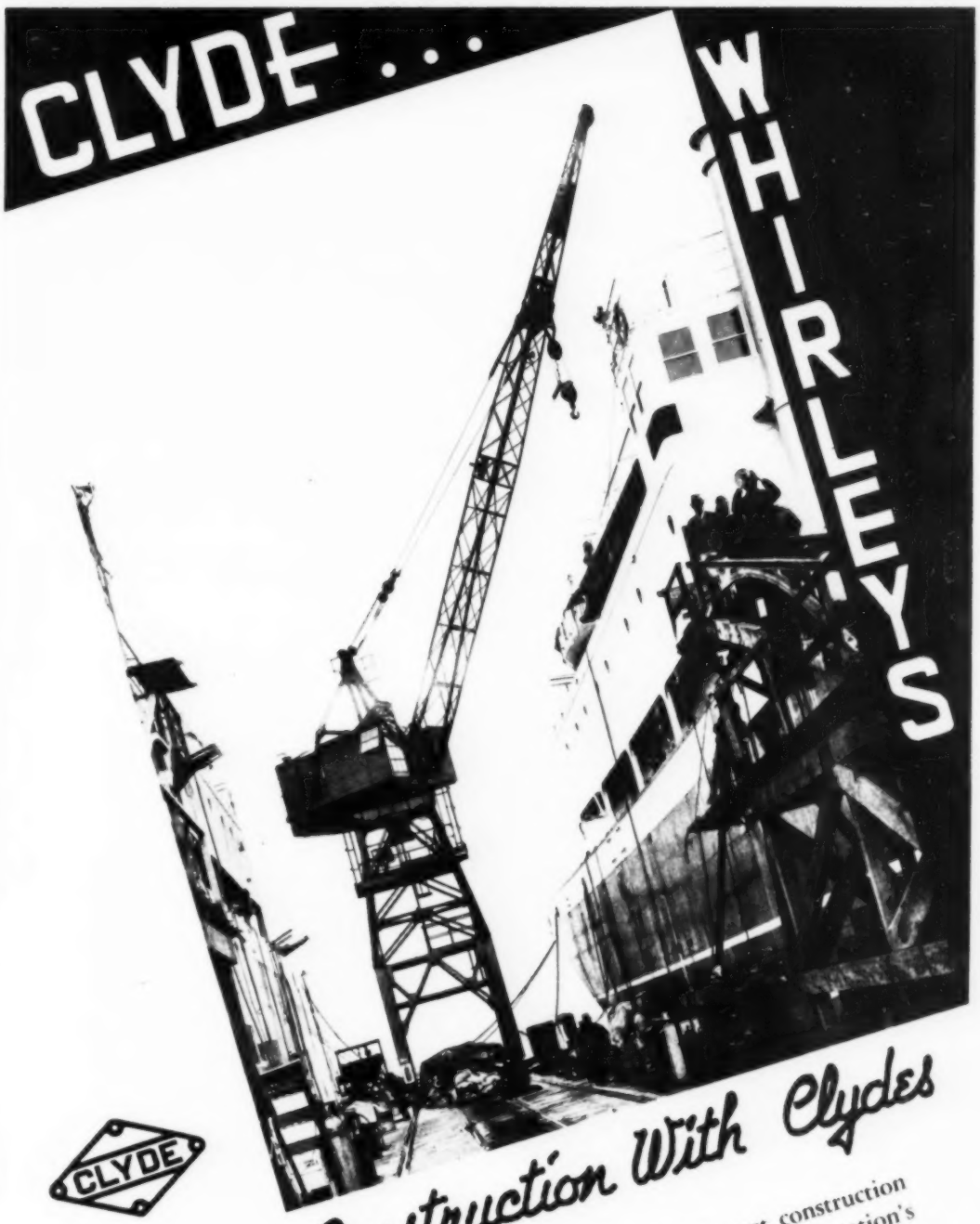
All houses were built to standard Navy plans. Wood roof sheathing was prefabricated in panels about 5 ft. wide running the full length of the house, and the panels were secured to the steel truss roof frame. The roofing consisted of 30-lb. felt covered with asbestos-cement shingles. Accompanying photographs illustrate details of exterior and interior construction of the houses.

Plans for the housing project were completed and the contract was signed while Comdr. Carl H. Cotter (CEC) U.S.N. was officer in charge of construction at the air station. Since about Dec. 1, the work has been under the direction of Lt. Comdr. Robert H. Meade (CEC) U.S.N., officer in charge of construction.

Charleston Project

Multiple-dwelling houses, consisting principally of two-story buildings containing six living units each, are arranged in

(Continued on page 106)



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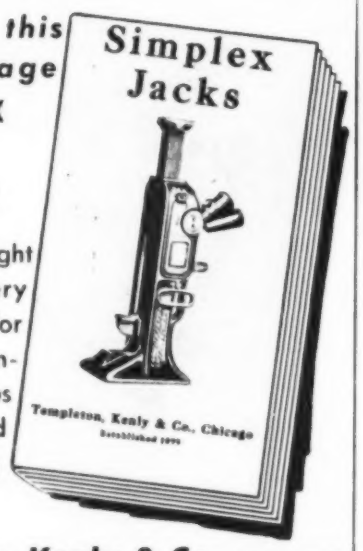

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dependable and efficient
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Hydraulic for easier cap lifting.
Screw Jacks for economy.

(Continued from page 105)

pleasing pattern on a well-planned layout of curved main arteries and radiating service streets in a pine wood plot purchased by the Navy near the Charleston, S. C., Navy Yard. Calling upon a Charleston architect, Douglas Ellington, to serve as consultant, the public works officer and his staff at the Navy Yard decided to build wood-frame structures utilizing moisture-resistant fiber board sheathing, siding and roof shingles of asbestos-cement and interior wallboard in large sheets to permit rapid dry-wall construction at a cost well within the $3,000 limit. The Southeastern Construction Co., Charlotte, N. C., completed the project on schedule as the contractor for the Navy Department on a cost-plus-fixed-fee basis.

An allotment of $590,800 was provided to cover total cost of the 200 dwelling units, including land and all utilities and services such as street paving and lighting. With the job completed, enough money remained out of the allotment to pay for at least one, and perhaps two, additional six-family houses, and sufficient unused land was available on the 23-acre property

DESIGNED FOR DRY CONSTRUCTION, houses utilize fiber wallboard for interior walls and ceiling. Oil heater placed in living room of each unit maintains comfortable temperature through Charleston winter.

to take care of about twenty such buildings. Utility lines are of adequate capacity to permit extension for all future additions on the site.

A contract was signed with the Southeastern Construction Co. on Oct. 25. Working a six-day, 48-hr. week, this firm pushed construction at a speed which permitted 48 families to take first occupancy on Feb. 1. One month later the entire project was completed and occupied.

Dwelling units consist of three, four and five rooms (one to three bedrooms each) to accommodate families of varying size. The average number of rooms is four. Differing from the Miami and Jacksonville projects, which are for enlisted personnel, the

(Continued on page 109)

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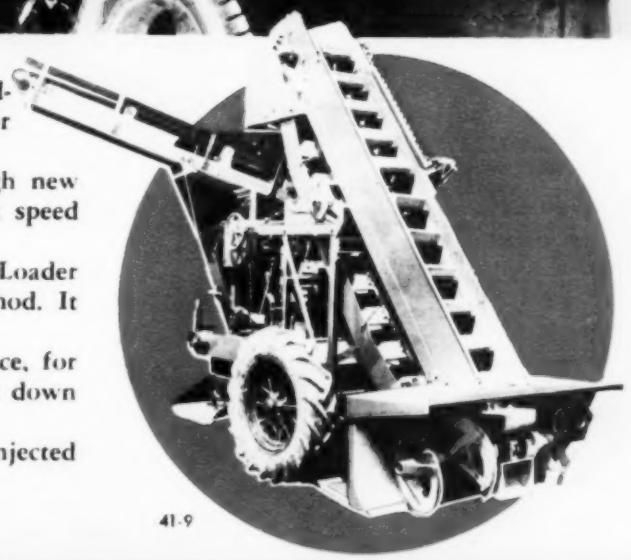

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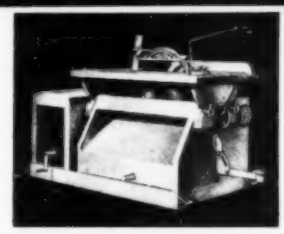

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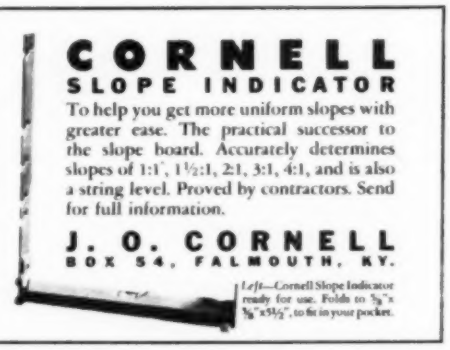

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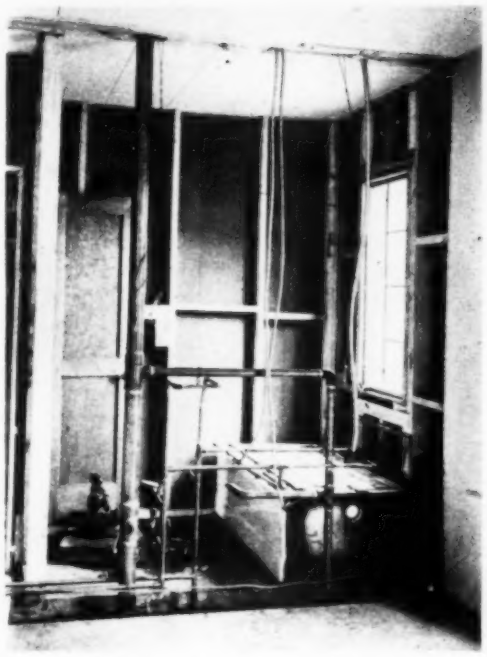
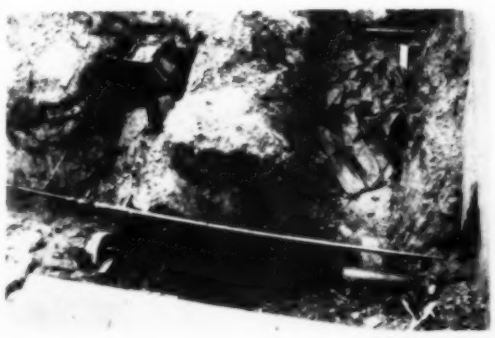


COPPER PIPE for plumbing as well as for water lines is distinguishing feature of Navy houses at Charleston, S. C.

(Continued from page 106)

Charleston housing is for civilian employees of the Navy Yard.

Interior walls are surfaced with hard-pressed fiber wallboard which came to the job with the first coat of paint already applied. Ceilings are a softer fiber board. For sound deadening and insulation between apartments, partitions and ceilings separating the living units are insulated with a felted matting made up of marine vegetation stitched between two layers of heavy kraft paper. Finish flooring is asphalt tile downstairs and gum flooring in all upstairs rooms and halls of duplex apartments. Water pipes and plumbing,



VALVE BOX on outside water line provides connection for garden hose. Note copper soil pipe extending from house toward vitrified clay sewer drain.

including soil pipes, are copper throughout. The kitchen equipment includes an electric cooking range and electric refrigerator; each apartment has an oil heater in the living room. Fuel is supplied to the heater through a tube connection from a 50-gal. drum placed outside the house at the back door.

Comdr. W. M. Angas (CEC) U.S.N., public works officer at the Charleston Navy Yard, assisted by Ensign W. F. Weaver, CEC-V (S) U.S.N.R., was in charge of design and construction for the Navy Department.

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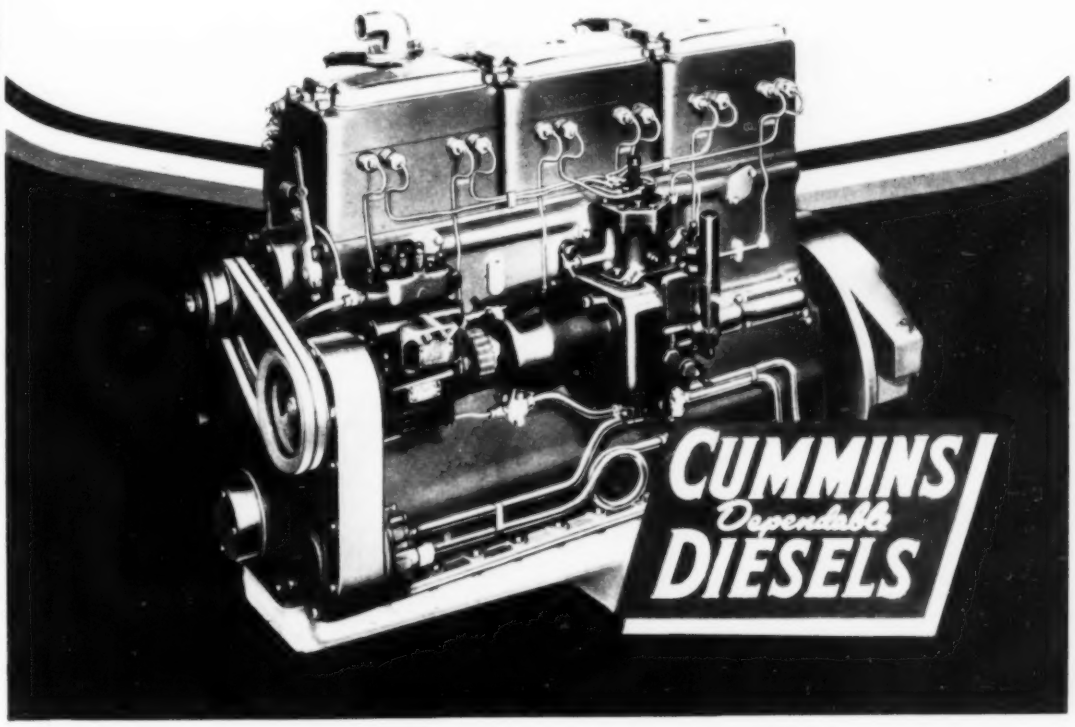

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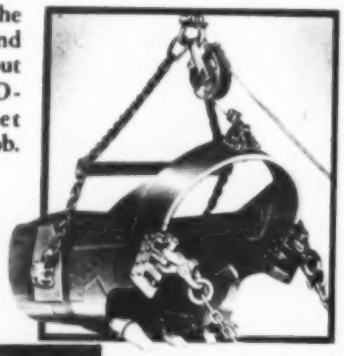

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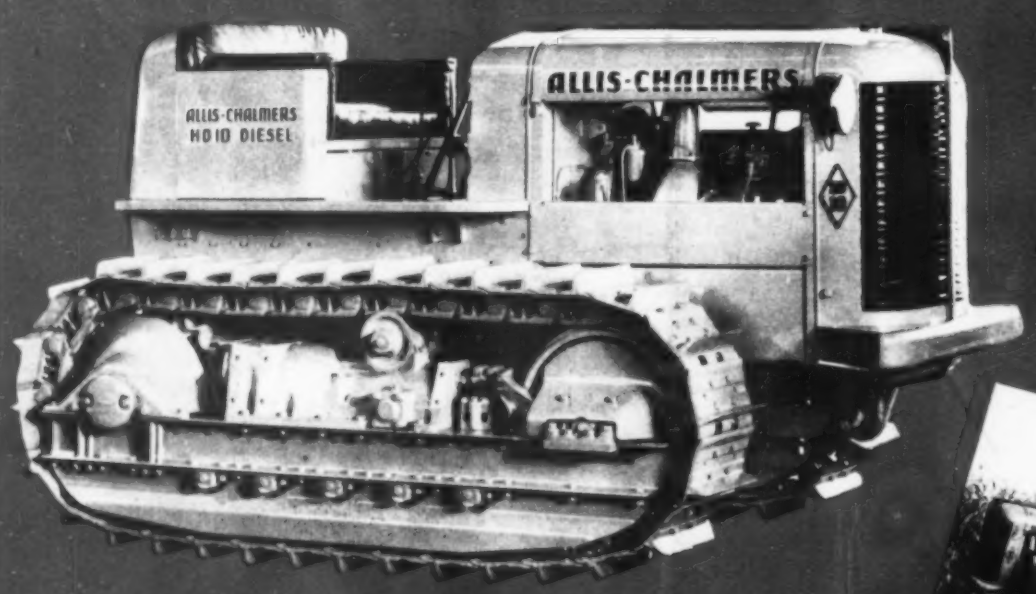

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